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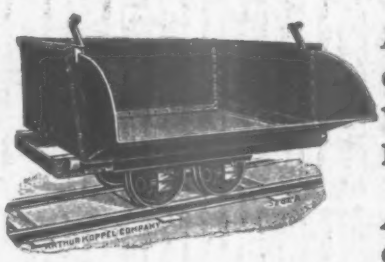


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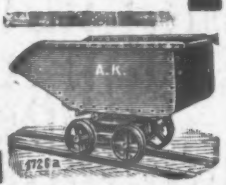


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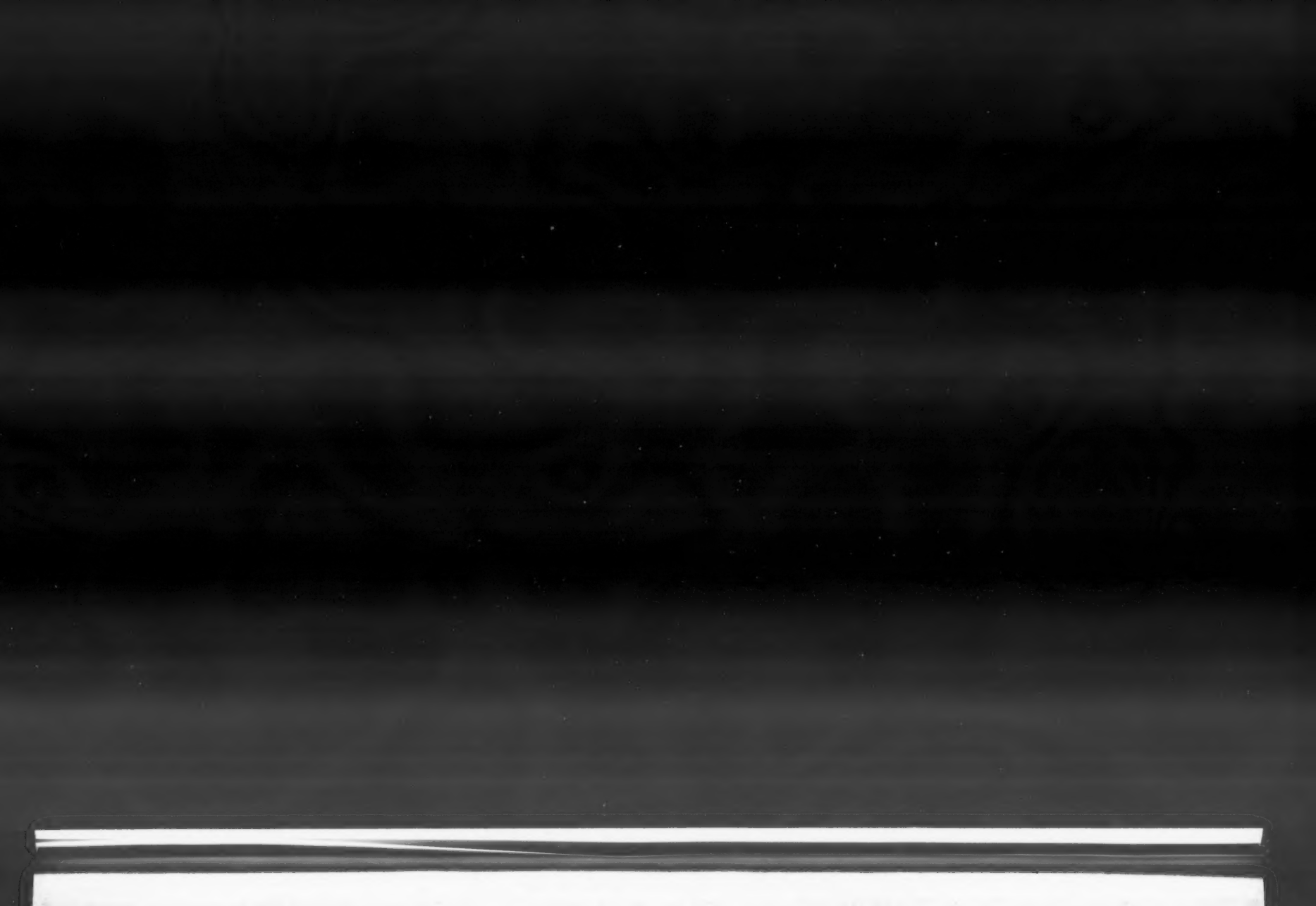


# MUNICIPAL ENGINEERING

VOLUME XXXII. MAY, NINETEEN HUNDRED SEVEN. NUMBER FIVE.

## THE MUNICIPAL ELECTRIC LIGHT PLANT OF HAGERSTOWN, MD.

Prior to the installation of the Municipal Electric Light Plant at Hagerstown, Maryland, the owners of the street railway system of the city had the contract till the spring of 1901 for lighting the streets with 93 series open arc lamps all night and every night for the sum of $62.50 each per annum. While this rate was not considered excessive the charge for commercial lighting was eighteen cents per hour. Since the installation of the municipal plant this has been reduced to 12½c per hour with liberal discounts bringing the rate as low as 6¼c per hour to heavy consumers.

The owners of the traction system did not seem satisfied with the control of the electric lighting of the city, as they had secured control of the only gas company in the town and it was reported that they were also trying to get control of the city water system, which was owned by a private corporation. Thus the citizens of the town were brought face to face with a three cornered monopoly and by an overwhelming majority decided by ballot to instal an electric light plant for commercial purposes as well as for lighting the streets of the city.

The plant has been in operation for six years and does not have the field alone as the traction company still furnish current for commercial purposes.

The revenue from the plant during the past year was nearly sufficient to pay all the operating expenses, including the interest on the original investment and the depreciation (which is figured at 6 per cent on the entire plant including ground and buildings) as well as the other expenses set forth in the appended statement. All expense of constructing new pole lines, such as poles, cross arms, labor and freight on material are charged direct to operating expenses.

The manager of the plant assures the tax payers of the city that in the course of another year the revenue will be sufficient to meet all the expenses of the plant including interest, depreciation, etc., without any tax levy, which will give the city the benefit of having its streets lighted every night and all night, as at present, with 141 series enclosed a. c. arc lamps, practically free. If a nominal charge of $50.00 each were made for the street lights a profit of over $7,000.00 per annum would be shown.

Besides the manager, there are two engineers, two firemen, one lineman, one trimmer and one assistant trimmer. Politics has no place or part in the management of the plant and the manager's advice to the many inquiries which he receives from time to time from other municipalities concerning the operation of the plant is to "steer clear of politics".

HAGERSTOWN, MARYLAND, MUNICIPAL ELECTRIC LIGHT PLANT.

(From Annual Report for year ending March 31, 1907.)

Original Installation.

| | |
|---|---|
| Plant installed April 1, 1901, consisted of power house and ground; two 250 h. p. Buckeye tandem compound engines; One 500 h. p. Buckeye cross two 175 k. w. Westinghouse a. c. generators; two 250 h. p. Heine water tube boilers, with Hawley furnaces; pole line, 117 Series enclosed arc lamps, regulators, transformers, etc., at total cost of..... | $63,323.74 |
| Additional equipment and betterments added to date; One 500 h. p. Buckeye cross compound engine; one 330 k. w. Westinghouse a. c. generator; two 250 h. p. Erie City water tube boilers; one 100 light general electric c. c. transformer, arc lamps, transformers, meters, wire for line extensions, etc..... | 31,566.45 |
| Total cost of plant to date... | $94,890.19 |
| Depreciation to date..... | 21,660.27 |
| Net value of plant March 31, 1907, ..... | $73,229.92 |

Operating expenses for year ending March 31, 1907.

| | |
|---|---|
| Salaries and labor (including labor for building 4 miles of line extension | $5,611.31 |
| Coal | 7,755.94 |
| Incandescent lamps (furnished free) | 742.46 |
| Water | 623.19 |
| Litigation | 620.47 |
| Carbons | 431.10 |
| Oil | 262.04 |
| Freight, express and hauling | 253.21 |
| Inner and outer globes | 254.38 |
| Packing | 203.54 |
| Unloading coal | 149.74 |
| Lamp repairs | 139.25 |
| Interest | 2,435.32 |
| Rent, office | 90.00 |
| Telephones and telegrams | 76.13 |
| Cross-arms, brackets and pins | 69.53 |
| Waste | 49.18 |
| Ice | 26.85 |
| Sundry repairs and supplies | 286.52 |
| Depreciation for year ending March 31, 1907 | 4,293.76 |
| Total operating expenses for year ending March 31, 1907 | $24,373.92 |
| Amount of revenue from lighting and power for year past | 22,771.55 |
| Excess of operating expenses over revenue for past year | $1,602.37 |

This deficit represents the net cost of operating the 141 street arc lights for the past year, all night and every night or the average net cost per arc light for the year ending March 31, 1907, of $11.37, which amount was provided for by tax levy as well as the following new equipments and betterments:

Betterments added during year ending March 31, 1907:

| | |
|---|---|
| Boiler and addition to power house, etc. | $2,530.38 |
| Transformers | 1,006.93 |
| Wire for line extensions | 1,240.46 |
| Meters | 919.43 |
| New arc lamps | 263.77 |
| Total | $5,960.97 |

For the past year the profit at the rate of $50 for each street lamp would be $5,448.63. The reduction in cost to the city of the street lighting from that under the former contract with the street railway company would be obtained by computing the lights at $62.50 each, the former contract price. This shows the saving to the city to be $7,210.13. The saving to the patrons is greater than this if one can assume that the amount of current used at the former prices would be the same as that used under present conditions. Assuming the maximum present rate of 12.5 cents as against the 18 cents of the former contract, the saving to customers is not less than $10,000 on this assumption.

We are indebted to Mr. J. O. Beard, the manager of the Hagerstown municipal electric light plant for the data and the information given.

## BUILDING THE NEW CITY OF GARY, IND.

One year ago MUNICIPAL ENGINEERING presented a sketch of the plan for the construction of the new city of Gary, Ind., to house and care for the operatives in the new plant of the United States Steel Corporation. Mr. A. F. Knotts, former mayor of Hammond, Ind., was put in charge of the beginning of the new city, as manager of the Gary Land company and has pushed matters so rapidly that he has recently resigned this position and accepted another equally good position with the company, the problems which he was given having been practically solved and the remaining work being largely detail matter.

As stated more in detail in the article appearing in May, 1906, the company purchased through Mr. Knott, a large area east of Hammond and Indiana Harbor along the shore of Lake Michigan in Lake County, Indiana. Part of this land lies between the Grand Calumet river and Lake Michigan, and on this part the steel plant will be located. The remainder is located south of the Grand Calumet river and on this the city of Gary will be located. The ground included in the site has an extreme distance between north and south points of six miles and a length east and west of seven miles, and contains nearly twenty square miles, twelve miles of which belong to the company. Nearly two-thirds of this area is in the area devoted to the city.

Five trunk lines of railroads pass through the town site. Arrangements have been completed for moving some of these roads and carrying them through the town site on a common elevated structure.

We are indebted to *System* for the photographs and maps which appear with this article and show the progress which is being made in paving, in supplying water and sewers and in building.

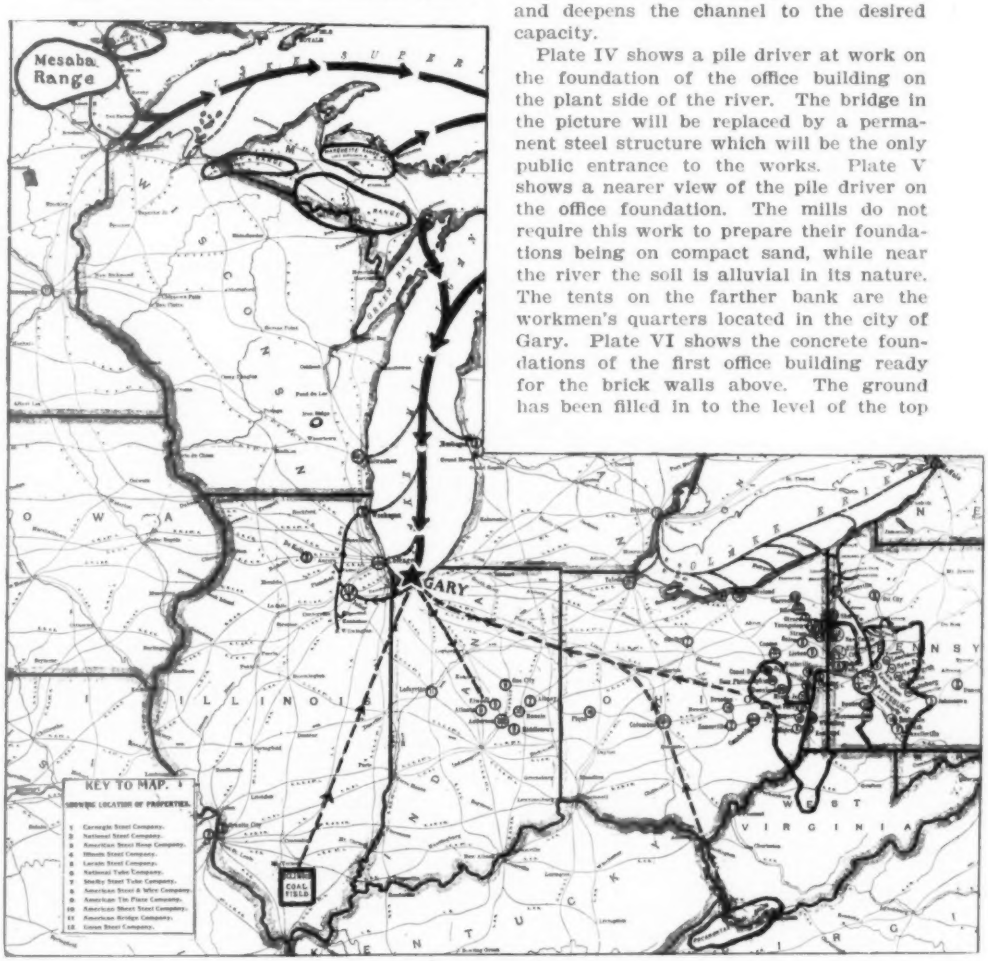
The map, plate I, shows the position of Gary with reference to the raw materials and the other manufacturing plants belonging to the United States Steel corporation, which will take the steel made at Gary from the raw materials and turn it into commercial products. The arrows pointing toward Gary show

the course of the iron ore from the Lake Superior ranges, the coal from Illinois and West Virginia, the coke from Pennsylvania and West Virginia, the limestone from Illinois and Michigan. The numbered circles show the locations of the plants of the twelve subsidiary manufacturing plants of the great company. The list in small type in the corner of the map includes the Carnegie, National, Illinois, Lorain and Union Steel companies, the American Steel Hoop company, the National and Shelby Steel Tube companies, the American Steel and Wire company, the American Tin Plate company, the American Sheet Steel company, and the American Bridge company. The great plants of the corporation at Buffington, North and South Chicago, Joliet, have fully demonstrated the value of the position, and Gary had all the advantages of Chicago with the additional advantage of square miles of vacant land where inner and outer harbors could be developed in a soft material, ideally easy to excavate, on which to locate the docks for the iron ore, coal and steel receipts and shipments.

The second map, plate II, shows the first sections of the great steel plant, the changes to be made in the shore line of the lake and the river, and a part of the city of Gary. The plan for the steel plant will be left to speak for itself. About one-third of it is seen to be located on ground to be made out of the shallow edge of Lake Michigan, running the docks and harbor entrance out to deep water.

The cut, plate III, shows the dredging of the new channel for the Calumet river. The first excavation is done by the orange peel dredge shown in the picture. It is followed by a bucket dredge which widens and deepens the channel to the desired capacity.

Plate IV shows a pile driver at work on the foundation of the office building on the plant side of the river. The bridge in the picture will be replaced by a permanent steel structure which will be the only public entrance to the works. Plate V shows a nearer view of the pile driver on the office foundation. The mills do not require this work to prepare their foundations being on compact sand, while near the river the soil is alluvial in its nature. The tents on the farther bank are the workmen's quarters located in the city of Gary. Plate VI shows the concrete foundations of the first office building ready for the brick walls above. The ground has been filled in to the level of the top




I. THE SITUATION OF GARY, IND.

of the concrete. The tents in the former picture have been replaced in this by tarpaper shacks, to be used as winter quarters.

The general method of laying out the city is indicated on the map in plate II. Broadway, running north and south and Fifth avenue, east and west, are the main business arteries, each one hundred feet wide. Other streets are sixty feet wide and alleys are thirty feet. The blocks are longer north and south, so that houses will most of them face east or west. The narrow building spaces along Fifth avenue show the method of providing for the service to the business houses fronting on that thoroughfare.

Plate VII shows Broadway, looking south from Fifth avenue, with grading finished. Plate VIII shows the same street in the second stage, cement sidewalk construction. The concrete base for the walk is mixed in the portable power mixer in the background. The wearing surface is mixed in the troughs in the foreground. Plate IX shows completed grading sidewalk, curb and gutter. The tracks shown in this picture are service tracks for delivering material for construction purposes, which are afterward removed. Plate X shows Broadway after a concrete pavement has been laid in the roadways each side of the central unpaved strip reserved for street railway tracks, which the street railway company will be required to pave after their tracks are laid. The sidewalks are 17 feet wide, the central unpaved strip about the same, leaving 25 feet for the width of the pavement in the roadway on each side, the total width of the street between property lines being 100 feet.

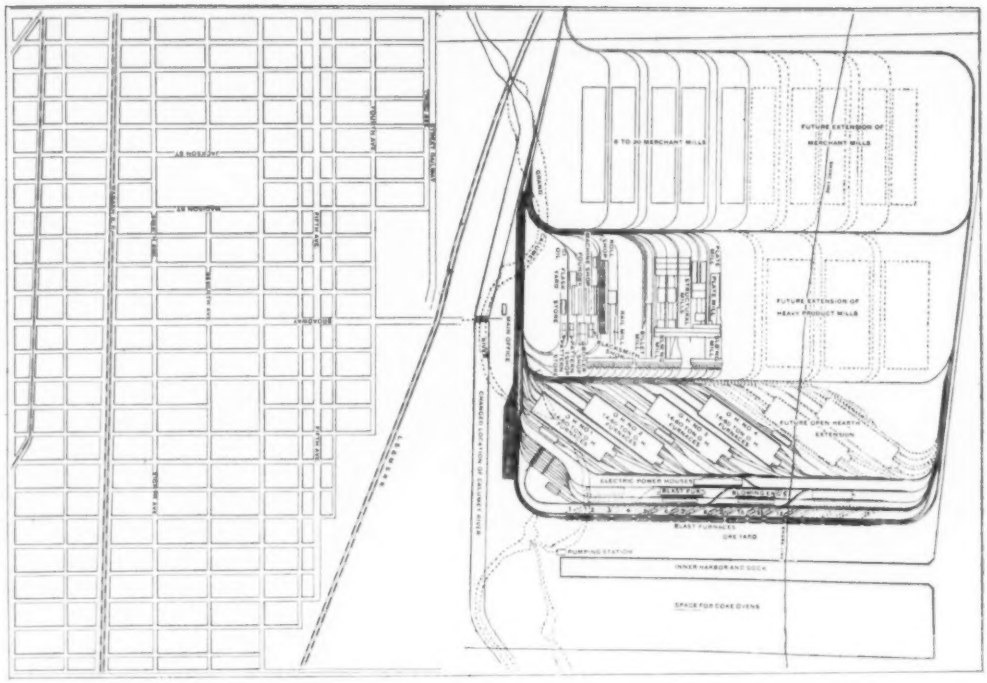
Plates XI and XII show Harrison street, looking north from Seventh avenue in two stages of its progress, the first photograph being taken December 15 and the second January 17. Construction is continuous, excavators, foundation builders, framers, outside finishers, slate roofers, lathers, stair builders, plasterers, etc., following each other, from house to house down the street. The houses under construction, four hundred of them now under roof, range from $1,600 to $13,000 in cost and the first are now practically ready for occupancy. Lots vary in price from $10 to $140 a front foot, and are sold as nearly as possible only to those who will occupy them.

The alleys are made 30 feet wide because, as nearly as possible, all sewers, water and gas mains and electric wire conduits, will be laid in them. They will be paved.

The water supply and sewerage problems are not particularly difficult of solution, except, perhaps, sewage disposal. The town-site is all of it some 18 to 20 feet above the lake level and is so sandy that the rainfall disappears in the soil as rapidly as it falls. The house roofs and street pavements will change this condition materially, but the short run of sewers to the river, each one independent, makes the sizes of sewers very moderate. The flow of the Grand Calumet river is ordinarily some 2 or 3 cubic feet a second, and the water supply must be taken from the lake, so that it will be necessary to pump the ordinary sewage flow up into a disposal plant. The storm water overflow, even though somewhat polluted, will be diluted in the river, when the mills are running, by some 25 cubic feet a second of water from condensers, coolers, etc., in the steel mills. The sewage disposal problem has not been worked out as yet, but the process will probably be septic tanks with intermittent filtration through the sand of the neighborhood. The water supply will be taken through a 6-foot tunnel from an intake in water 40-feet deep, 7,000 feet from the present shore line and about 3 miles from the center of the city. The water will flow by gravity through this tunnel of 60,000,000 gallons capacity a day to the pumping station in a park, where it will be pumped by electricity, the electric power being generated by engines operated on the waste gases of the blast furnaces at the steel works. Twenty-one miles of 6-to-30-inch pipe is now being laid. The water supply system of the steel works is independent of that for the city and has 100,000,000 gallons a day capacity.

Plate XIII shows the method of laying sewers. Sewers being in alleys makes it most convenient to have catch basins in centers of blocks. Hydrants are also located most conveniently near the centers of blocks. Plate XIV shows the laying of water pipe.

The last plate is a portrait of Elbert H. Gary, the chairman of the executive committee of the United States Steel corporation, after whom the city is named.




II. PLAN OF PART OF GARY AND STEEL WORKS.

III. DREDGING NEW CHANNEL FOR GRAND CALUMET RIVER.

# THE COMMERCIAL VALUE OF SHOP DRAWINGS FOR CONCRETE STRUCTURES.

*By Louis H. Gibson, Architect, Indianapolis, Ind.*

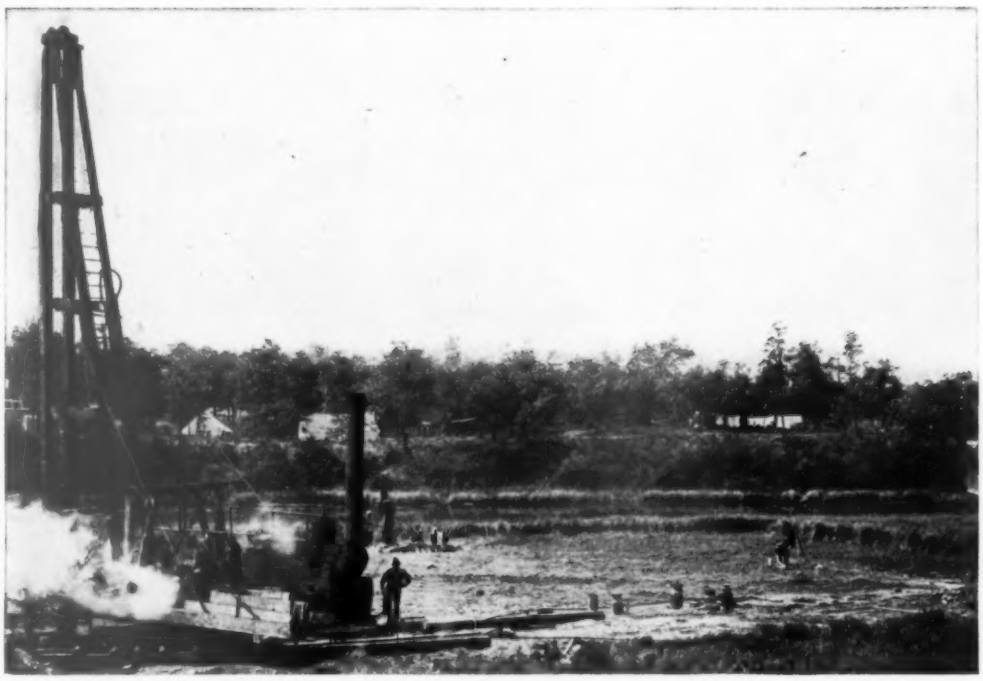
In the last article relating to concrete architecture in particular, the commercial value of Art was considered. We understand that, if we had only to consider our bare physical necessities without regard to appearance, the material value of our possessions would be reduced very greatly. If we consider mere physical protection from the elements as the only thing necessary in house building, or if we consider the mere covering of our physical bodies without respect to appearance, and if we consider the mere structural value of our furniture and the cost of the material substances which surround us and which we use, their value would be very greatly reduced. Through this line of thought and argument we are enabled to understand the commercial value of beauty. We are led to believe that a pleasing form of concrete work need involve the expenditure of no more material and labor and need cost no more money than the ugly form, and are convinced that good proportion need cost no more than bad proportion, and that a pleasing outline need cost no more money than one that is ugly.

There is now to be considered the question of workmanship, the question of structure and that of the proper adjustment of materials of construction. The concrete workers have in the main made a bad impression on the minds of the public on account of bad workmanship, or the indifferent putting together of parts. There is more or less cobbling. This is one of the elements which has prevented the use of concrete materials, and cement blocks in particular, in the best structures. If an architect is going to erect an important building, a structure for stores or office purposes, or a good dwelling or a church, he rarely or never takes into consideration the cement block as now made and installed. An architect or a builder has to consider his reputation in the choice of materials, and though it frequently happens that the client asks why cement in some of its forms cannot be used for the exposed parts of the building and for decorative purposes, it is the tendency, almost invariably, of the architect to resist their use. While it is true that they recognize the possibilities of the successful use of concrete for building purposes the experience on the ground of workmanship has been so unsatisfactory that neither the architect nor the builder is disposed to take chances. There are exceptional instances sufficient in number to indicate just what may be done with concrete,—notably the work of Mr. Watson, which has been illustrated in the pages of MUNICIPAL ENGINEERING. This and other work which cannot be mentioned here shows the possibilities both of concrete block and monolithic concrete work.

After giving due consideration to the artistic quality of concrete work, which relates to the texture of the surface, and of the decorative parts and forms, there then comes the question of workmanship, which is relative to the installation of the parts. The material may be never so well formed, either as to substance, texture or decorative interest, and yet fail of the artistic result if it be not properly installed by the workmen. Cement workers have been as much at fault in one of these matters as the other, and there must be a reformation in both instances before we can expect any large measure of commercial success in the use of concrete as an exposed or decorative material in important structures. This done, the field for the concrete worker is very greatly enlarged and the business opportunities are practically illimitable.

We do not have to try experiments, we do not have to indulge in uncertainties. A large measure of the defects may be met and the problems solved over the drawing board. This is the first step. Cement blocks and cement work must be made to fit the plans of the architect, the builder and the engineer, and not the plans to fit the blocks or the material. When the architect makes a design involving the use of terra cotta or stone he merely considers what he wants in the way of forms and outlines the general proportions. The conditions of his requirements are met without question by the terra cotta worker or the stone cutter and no question is raised as to adapting the plans to the particular forms or the particular shapes. The same is true with respect to metal, and in a large measure with respect to brick and all other materials. A distinguished engineer recently made a remark in a public meeting that a new style of architecture would be developed to meet the requirements of the cement block. This will never happen. The cement block, and concrete work in whatever form, must be accommodated to

IV. PRESENT CHANNEL OF GRAND CALUMET RIVER.
Pile driver on site of office building.



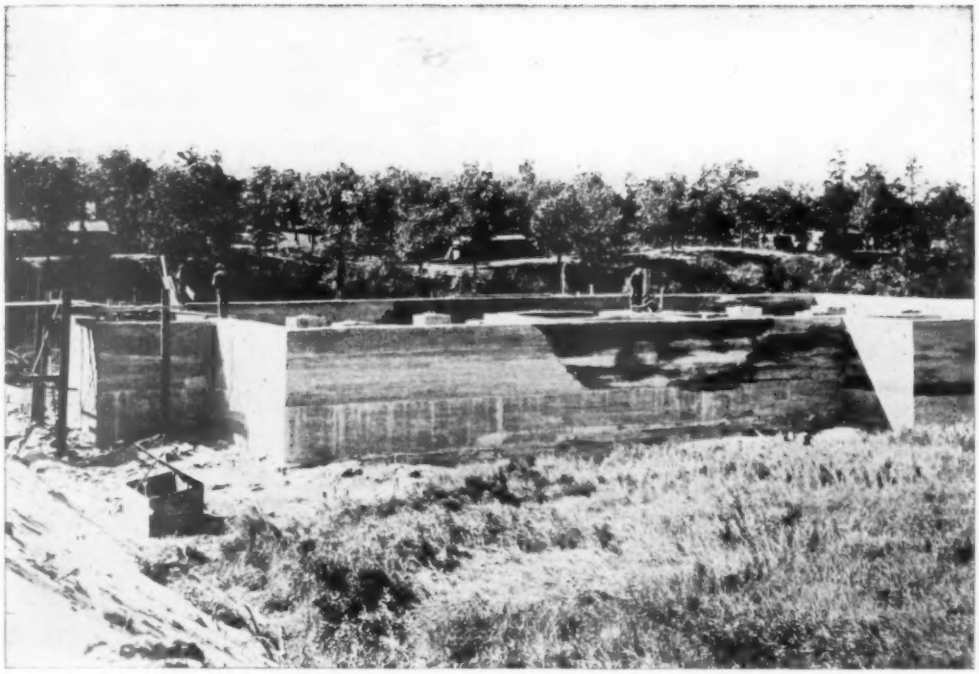
V. SITE OF OFFICE BUILDING OF STEEL PLANT.
Tents on site of Gary in background.

the requirements of the plans and specifications of the architect, the engineer and the builder. If this be not done the usefulness of this material and the commercial possibilities will be limited. We know from exceptional instances that it can be done, and as a matter of business it must be done.

The processes of manufacturing during recent years have been very largely changed. The large part of the thinking is done in the drawing room and not in the shop. The effort is to develop what is sometimes known as a "Fool proof organization." Take the instance of the terra cotta shop. The engineer or superintendent, having secured his contract, takes his blue prints and specifications into the drawing room, goes over them first in a general then in a practical way and proceeds to lay out, not the general scheme but each particular detail. This is done on paper. Nothing is left to the workman that is in the modeling room or the plaster shop or on the floor to think about excepting to carry out the plans. If in the course of making the drawings there appears a question as to the interpretation or as to the possibility of more than one interpretation, careful notes are made of these and the architect and the builder or the engineer are called in and each particular question is considered on its merits and the result noted definitely, and the general plans and the shop plans are corrected on this basis. Each block and each fragment of material is lettered and numbered on the drawings, corresponding letters and numbers are put on the blocks, and as the blocks leave the factory they are charged out by letter and number and in the event that the material is to be set by the bricklayer or the general contractor copies of shop drawings are furnished to him. Thus the terra cotta maker is absolved from all chance of error and there is no possibility of making a mistake in the setting of the parts. The careful preparation of the shop drawings and the setting plans is for only one purpose, and that is to save money by saving time and material. Time is saved by the workmen in the shop, the chance of error is reduced to the minimum and the possibility of making mistakes in setting is practically eliminated.

This plan is purely a business proposition. No plant can be so small and none so large but what this method can be adopted as a measure of economy as related to the first cost of the material and as absolute necessity in securing good workmanship. Plans similar to these are now in use in all kinds of establishments where anything is made. There is first the drawing room where the entire proposition, in all its details, is first considered on paper, matters of expediency, details of installation and method of work are fully discussed and indicated before the drawings go into the shop. One can see this plan in operation wherever labor is used in producing anything. It enables the manufacturer to employ a larger volume of cheap labor. In this city, for instance, there is a buggy manufacturing establishment which goes onto the street, picks up workers, takes them into the shop and because of superior organization, because the thinking has been done and the plans formulated before the workman has been taken into consideration or employed, the labor cost is very much reduced. Structural metal establishments leave nothing to chance. First there are the shop drawings and then the templates, so that all the workman has to do is to carry out the thought and idea that is presented to him in a mechanical way without chance or opportunity of error. In the drawing room the thinking force is reduced to the minimum in order to reduce the chance of error. The effort is to get as close to the personality and intelligence of a single directing force as possible.

All of this may sound rather complicated and involved with too much detail for the ordinary cement block worker. If the cement block worker, however, expects to succeed, expects to do good work, he must adopt the general principles of this plan. Let us assume that there is presented to him the problem of furnishing blocks for a three room cottage, with its doors, windows, flues, walls and the other related parts. There is no difference in the problem in the construction of the plans from those for a ten-story office building covering a quarter of a square. The cement block worker must understand not alone his part of the work in the fabrication of the blocks but he must have a distinct idea of the character of the other related parts; the size and position of the joists, the relation of the rafters to the top of the wall, the construction of the door and window frames, the position and construction of the porch, in order to properly lay out and make his material. There must be a floor plan, probably a ceiling plan, sections through the walls showing the joists and rafters and the various heights and then the four elevations in which the size and position of each block is shown, and in case of changes in form from ordinary shapes, drawings will have to be made. These various parts must be lettered and numbered and corresponding letters and numbers must be placed on the block so that, when they are delivered to the workmen



VI. FOUNDATION OF OFFICE BUILDING OF STEEL PLANT.

VII. BROADWAY, GARY, IND.
Looking south from Fifth Avenue, street graded.

or the general contractor, each joint will come exactly in its proper position so that all the window and door frames will fit and the joists and girders will find accommodation without hacking or cobbling, so that there will be a place for the porch supports, and every other detail. Thus the work of the cement block maker is not only to be considered, but also that of the other co-operating workmen. This has not been done during the past, and the result shows for itself, in most of the cement block buildings that have been put up.

The cement block maker who cannot lay out his work or cannot draw sufficiently well to express his plan to others cannot expect to be successful in his business. He must either be able to do it himself or have some one in his employ who can do it. The writer recently had occasion to inspect a cement block structure with the view of making an appraisement as the basis of a loan. It had occurred to the owners about the time the roof was on that they would have to arrange to get money to pay for the structure. The blocks were fairly well made, had a good surface, and altogether the work in that respect was good, but over the head of each window there was a space three inches high which would have to be filled, and there was an open space through the wall three inches in height the full width of the frame. The window sills were cobbled into the wall and did not reach under the wood subsills. The door sills did not reach to the joists and did not come to the height of the finished floor. No provision had been made for the insertion of porch joists or for the rafters and supports of the porch roof, and at the time of inspection a workman was cutting holes into the concrete in a way that very greatly destroyed its structural value. On the inside no provision had been made for carrying the stair landings and here too cutting was being done which left only two inches of solid concrete on the outer surface of the wall. An inspection developed that the outer surface had not been bedded sufficiently with mortar to entirely close the joints, thus one could look through the wall and see daylight on the outside. It is fair to presume that the owner did not get a very liberal appraisement on this building. This is not an exaggerated instance. Throughout the towns and cities of this state, where this material has been used, and in adjoining states, the writer has seen many instances of this kind. Oftentimes in laying off the blocks an open space has occurred which had to be filled in with solid concrete. It nearly always happens in the ordinary run of work that the sills and window caps cause complications. These have not been studied in the shop and in connection with the drawings, and develop very serious physical defects in the finished structure. Difficulties of this kind can be, and should be, considered on paper and definitely solved before any part of the manufacture of the block has been undertaken.

The result of so much work of this kind in connection with cement block building has led to unjust criticism and unfair conclusions with respect to the blocks themselves that the public are coming to assume that there are inherent difficulties in the way of block construction which cannot be met, merely because they have not been met; they have associated bad workmanship and faulty execution with the material that has been used. While this is manifestly unfair it must be understood that the public do not make fine distinctions or reason very far in connection with matters in which they are not obliged to take an interest.

Building work has during recent years come to be systematized and organized in a way that was not thought of hitherto. It is now possible to so lay out a building scheme that all probable contingencies may be definitely estimated, and provided for in advance. It is this systematic and orderly method of handling building material that has developed the cost plus fixed sum method of doing work. There are a number of concerns and individuals who are doing a very large, profitable and successful business on this basis. Because of their orderly methods they are enabled, not only to give accurate estimates, but to complete work in a remarkably short time and without friction or controversy. The cement worker must be prepared to keep up with the procession. If he does not do this his business will soon be discredited and he will have left behind him the heritage of bad work, which it will be difficult to live down. On the other hand, if a sufficient number of manufacturers organize their business on a systematic basis, and lay out all of their work as carefully and thoroughly as is done by contractors for other material, notably the terra cotta worker, the stone cutter, the structural steel contractor, they will soon have found that the building public and other contractors will have developed a respect and admiration for concrete in all its forms which will place this inherently valuable matehial on a fair competitive basis with other materials of construction.

While a great deal of confidence has been destroyed it may be renewed by systematic and orderly methods.

VIII. BROADWAY, GARY, IND.
Laying cement sidewalks.

IX. FIFTH AVENUE AT BROADWAY, GARY, IND.

## COMPARISON OF AMERICAN WITH ENGLISH CITIES.*

*By William S. Crandall, New York City.*

The rapid growth in population of great cities has been one of the significant facts in the history of the United States. In 1790 the census reported only six cities of more than 8,000 population, and only one with more than 40,000 inhabitants. Fifty years later, according to the census, there were thirty cities with more than 8,000, and five with more than 40,000 inhabitants, while in 1900 there were 547 cities with a population of more than 8,000, and ninety-four with more than 40,000 inhabitants. The increase in population continued to work on an accelerated ascending scale, for four years later there were 108 cities of more than 40,000, and twenty-five with between 100,000 and 300,000 inhabitants.

This group of twenty-five cities affords the most striking example of civic growth and progress ever known. American municipal government, bad as it is and bad as it has been pictured by both foreign students and home reformers, has made commendable achievements and strengthened the conviction that the civic, as well as the State and National governments, are resting on a firm foundation.

The first census, 1790, reported only four of the twenty-five cities named in the table as having any population, viz., Providence, Worcester, Memphis and Louisville. The aggregate population of these four cities amounted to 9,037. Fifty years later, in 1840, there were still ten cities out of the twenty-five that had not found a place on the map—Minneapolis, St. Paul, Kansas City, Denver, Los Angeles, Omaha, Syracuse, St. Joseph, Scranton and Portland, Ore. The total population of the fifteen other cities amounted to 166,375. Another fifty years found them all civic centers of importance, the smallest—Portland, Ore.—having a population of 46,385, and the largest—Washington, D. C.—with a population of 230,392. All of the twenty-five had increased in population more than ten times, excepting four—Louisville, Providence, Rochester and New Haven. The aggregate population amounted to 2,756,133. What is equally astonishing, during the fourteen succeeding years, the aggregate population jumped to 4,046,581.

The wealth of these twenty-five cities grew from a few million dollars in tax-

ASSETS AND LIABILITIES OF 25 AMERICAN CITIES.

| City. | Population. | Area in acres. | Total value taxable property. | Total debt. | *Total value city plants. | **Total value corporate property. |
|---|---|---|---|---|---|---|
| Washington, D. C. | 298,050 | 44,316 | $217,608,296 | $14,295,160 | $17,094,736 | $33,323,208 |
| Newark, N. J. | 272,950 | 14,481 | 138,405,027 | 24,475,200 | 9,529,219 | 23,764,546 |
| Minneapolis, Minn. | 250,122 | 34,105 | 100,411,030 | 10,153,710 | 5,564,119 | 18,088,756 |
| Jersey City, N. J. | 227,445 | 10,443 | 95,935,305 | 19,324,354 | 6,150,000 | 11,809,924 |
| Louisville, Ky. | 219,191 | 15,646 | 92,521,580 | 10,170,985 | 8,225,000 | 14,947,487 |
| Indianapolis, Ind. | 204,772 | 19,082 | 96,927,280 | 4,768,838 | 382,500 | 5,057,222 |
| Providence, R. I. | 194,027 | 11,703 | 164,632,920 | 18,235,334 | 4,818,514 | 15,460,143 |
| St. Paul, Minn. | 190,231 | 35,483 | 74,332,561 | 9,657,843 | 7,300,000 | 16,723,408 |
| Rochester, N. Y. | 177,228 | 11,635 | 114,342,100 | 11,688,734 | 8,031,629 | 14,913,582 |
| Kansas City, Mo. | 176,168 | 16,768 | 65,803,165 | 8,143,704 | 2,977,440 | 13,506,865 |
| Toledo, O. | 150,594 | 18,284 | 52,698,470 | 7,810,882 | 2,147,477 | 6,839,008 |
| Denver, Colo. | 148,714 | 37,920 | 83,729,175 | 4,367,557 | 173,500 | 10,566,944 |
| Allegheny, Pa. | 140,456 | 5,126 | 91,408,315 | 9,413,778 | 6,698,000 | 21,674,855 |
| Columbus, O. | 138,796 | 10,400 | 53,355,180 | 11,782,811 | 3,619,952 | 8,340,084 |
| Worcester, Mass. | 126,192 | 24,586 | 94,087,100 | 11,050,118 | 4,373,947 | 11,846,457 |
| Los Angeles, Cal. | 122,479 | 27,395 | 106,671,935 | 5,596,982 | 4,402,500 | 10,022,491 |
| Memphis, Tenn. | 117,452 | 9,821 | 49,396,020 | 6,341,112 | 2,773,330 | 6,482,430 |
| Omaha, Neb. | 116,963 | 15,680 | 71,340,305 | 7,189,619 | 25,000 | 5,707,310 |
| New Haven, Conn. | 116,827 | 13,972 | 94,061,580 | 3,760,032 | 30,000 | 4,800,193 |
| Syracuse, N. Y. | 115,374 | 10,948 | 81,362,911 | 7,987,896 | 4,697,726 | 9,648,582 |
| St. Joseph, Mo. | 112,979 | 6,080 | 19,805,530 | 2,127,369 | 10,500 | 1,519,807 |
| Scranton, Pa. | 112,331 | 12,333 | 63,445,485 | 2,484,175 | ..... | 3,865,570 |
| Paterson, N. J. | 110,257 | 5,357 | 46,164,703 | 4,491,286 | ..... | 2,632,655 |
| Fall River, Mass. | 105,582 | 25,515 | 49,670,900 | 6,217,633 | 2,179,243 | 6,510,179 |
| Portland, Ore. | 101,398 | 24,244 | 36,495,954 | 7,844,204 | 7,322,000 | 11,847,946 |

*Total value of such public utilities as the city may own and operate, including water, electric light and gas works, markets and public scales, docks, wharves and landings, cemeteries and crematories, bath houses and bathing beaches.

**Value of principal salable possessions, exclusive of sinking funds.

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X. BROADWAY, GARY, IND.
Grading, sidewalks, curb, gutter and roadway paving completed.

XI. BUILDING HOUSES ON HARRISON AVENUE, GARY, IND.
View taken, Dec. 15, 1906.

able real estate in 1840, to $2,154,606,827 in 1904. The addition of non-taxed real estate, such as public, church and other exempt property, would swell this vast sum to still greater proportions. A glance at the table, which shows, besides the area and population, the total value of taxable real estate; the total debt; the total value of public service plants owned by the city, and the total value of all salable property owned by the city, including land, public buildings, equipment and the like, will give a better idea of the tremendous progress made by American cities. In most instances this represents a growth of less than one hundred years.

Nearly twenty years ago the Hon. James Bryce, the present Ambassador of Great Britain to the United States, wrote the "American Commonwealth," which described our State and National forms of government as well or better than had ever been done by an American. The book consisted of two volumes of about 700 pages each, two short chapters of which were devoted to municipal government as he found it in the United States. In these two chapters he described the worst faults of civic government. The fact that he had so little to say about this phase of government, and nothing commendatory, led most people to jump to the conclusion that American cities were the worst ruled in the world. To quote his most striking criticism:

> There is no denying that the government of cities is the one conspicuous failure in the United States. The deficiencies of the National government tell but little for evil on the welfare of the people. The faults of the State governments are insignificant compared with the extravagance, corruption and mismanagement which mark the administration of most of the great cities. The commonest mistake of Europeans who talk about America is to assume that the political vices of New York are found everywhere. The next common is to suppose that they are found nowhere else. In New York they have revealed themselves on the largest scale. They are gross as a mountain, open, palpable. But there is not a city with a population exceeding 200,000 where the poison germs have not sprung into a vigorous life; and in some of the smaller one, down to 70,000, it needs no microscope to note the results of their growth. Even in cities of the third rank similar phenomena may occasionally be discerned, though there, as some one has said, the jet black of New York or San Francisco dies away into a harmless gray.

Few persons have ever made a formal public address upon civic government in this country that they have not quoted this terse criticism of Mr. Bryce. If, at the same time, they had stated the other fact that only two chapters out of two volumes of 700 pages had been devoted to municipal government, the criticism would not have had so much weight, for it would have been only too evident that the author was not qualified to express such a sweeping criticism. Most people are more familiar with the evils of their own city—and they generally consider it worse than any other in the land—than with the evils of their State or National governments, therefore it is not surprising that this criticism should sound so just and be so widely accepted. But any one who is fairly familiar with a score or more of the larger American cities, as well as with that of State and Nation, knows that it is not altogether a just criticism.

Naturally, Mr. Bryce's standard was formed from his observations of British cities. But it is not fair to apply a man's standard to a boy, for the man, if he has used his opportunities, is wiser than the boy. English cities possess the maturity, deliberation and conservatism of age, while American cities are ruled by the impulsive, strenuous and extravagant spirit of youth. Most of the leading English cities had their beginning four or five hundred years ago. Their development has been slow and sure. They have continually had the advantage, therefore, of profiting by the progress of civilization. They have not been obliged to build and administer the affairs of their cities in a hurry, for few emergencies have been thrust upon them. Thus they have had time to plan, to build, to evolve by the slow process of experience, methods and practices that gave admirable results in furnishing many public comforts at the minimum cost. They have attained a standard that is worth while.

Notwithstanding all the advantages possessed by the cities of Great Britain, it will not require very much study and comparison of the following table with the one above to show that, from the standpoint of material progress, the cities of America are not so far below the standard of English cities. These statistics were compiled from the "Municipal Year Book for 1906," relating to English cities, while those relating to American cities are for the year ending 1904, so that the contrast is still more favorable to the cities of the United States.

Another advantage which English cities have is found in the class distinctions which obtain in that country. Because of this the more intelligent and less corruptible members of society have ruled; hence, with greater efficiency and less waste of public funds. Whenever, by chance or otherwise, a middle class man has run for and obtained an elevated and responsible position in the city government, he has used it to satisfy his social rather than financial ambitions, which has yielded better results. Because of the

XII. BUILDING HOUSES ON HARRISON AVENUE, GARY, IND.
View taken Jan. 17, 1907.

XIII. LAYING SEWERS IN GARY, IND.

XIV. LAYING WATER PIPE IN GARY, IND.

ASSETS AND LIABILITIES OF 25 ENGLISH CITIES.

| City. | Population. | Area in acres. | Rateable value. | Debt. | *Value of public utilities. | **Total value corporate property. |
|---|---|---|---|---|---|---|
| West Ham..... | 294,997 | 4,706 | £1,284,931 | £2,207,723 | £ 242,588 | £2,248,049 |
| Bradford ..... | 285,589 | 22,843 | 1,538,870 | ..... | 5,898,410 | 9,515,736 |
| Hull ..... | 258,127 | 9,202 | 1,160,820 | 2,623,061 | ..... | ..... |
| Nottingham ..... | 251,677 | 10,935 | 1,196,674 | 5,471,462 | 5,131,901 | 7,446,182 |
| Salford ..... | 231,514 | 5,202 | 1,023,499 | 3,599,928 | 2,064,191 | 3,942,258 |
| Leicester ..... | 211,579 | 8,586 | 1,088,457 | 4,749,742 | 2,791,763 | 4,620,602 |
| Bolton ..... | 178,111 | 15,283 | 783,952 | 3,534,319 | 2,366,215 | 3,643,257 |
| Cardiff ..... | 164,333 | 8,408 | 1,096,696 | 3,302,210 | 2,145,388 | 3,739,349 |
| Croydon ..... | 147,704 | 9,014 | 1,047,906 | ..... | 722,616 | 2,006,338 |
| Sunderland ..... | 146,077 | 3,739 | 700,935 | 1,307,218 | 506,996 | 1,005,954 |
| Oldham ..... | 140,225 | 4,729 | 487,561 | 2,916,672 | 2,595,387 | 3,367,787 |
| Blackburn ..... | 129,116 | 7,431 | 530,498 | ..... | 2,443,790 | 3,661,584 |
| Brighton ..... | 127,183 | 2,620 | 895,503 | ..... | 1,527,877 | 2,263,496 |
| Derby ..... | 122,207 | 5,272 | 554,773 | 1,420,462 | 572,925 | 1,126,290 |
| East Ham ..... | 120,000 | 3,320 | 467,592 | ..... | ..... | ..... |
| Birkenhead ..... | 116,040 | 3,850 | 616,589 | 2,083,469 | 1,243,836 | 2,433,022 |
| Plymouth ..... | 116,000 | 2,533 | 524,565 | 1,995,521 | 1,299,608 | 2,092,026 |
| Preston ..... | 115,721 | 4,030 | 428,145 | 2,116,725 | 1,782,276 | 2,618,968 |
| South Hampton... | 114,897 | 5,817 | 561,771 | 1,131,122 | 552,666 | 1,184,975 |
| Norwich ..... | 111,733 | 7,582 | 436,126 | 803,559 | 322,234 | 1,149,634 |
| Gateshead ..... | 109,888 | 3,138 | 424,758 | ..... | 117,344 | 328,255 |
| Halifax ..... | 107,500 | 13,650 | 493,839 | 3,249,132 | 2,291,197 | 3,521,653 |
| Stockport ..... | 98,320 | 5,485 | 423,793 | 1,688,905 | 1,275,522 | 1,771,971 |
| Middlesbrough ... | 98,000 | 2,824 | 382,853 | 1,863,676 | 1,570,842 | 2,014,909 |
| Burnley ..... | 97,044 | 4,015 | 369,538 | 101,671 | 946,672 | 1,544,038 |

*Estimated value of water works, gas, electric light plants, tramways, markets, harbors, piers, docks, baths and burial grounds.

**Estimated total value of corporate property.

omnipresent politician in American cities this factor is usually missing.

These twenty-five American cities have sprung from the virgin soil almost within a night, as if by magic. In their planting, the founders have not only had the environments of the pioneer as obstacles to overcome, but the large waste of funds has often been forced by imperative emergencies. In most instances the growth of population has been so rapid that even with extravagant expenditures it has been impossible to keep pace with necessary public improvements. This mushroom growth has precluded the possibility oftentimes of thinking and planning how best to build and rule. This has opened the way for the gross misrule, mismanagement and corruption to be found in a few of the American cities.

There are evidences of municipal misrule in many of the larger cities to be found to-day—there were many more twenty years ago. But, in the light of recent revelations which have shown an equal or worse state of affairs in the State and National governments, the criticism of Mr. Bryce, that "the municipal government is the most conspicuous failure," is not true. Therefore, it is time that this criticism should be denied and placed upon the retired list. Whatever defects have marked the progress of American cities, no one who is intimately acquainted with the conditions surrounding their development, and who is familiar with their present status, will deny that substantial progress has been and is being made.

## BOOKS FOR ENGINEERS.

The list of books for Engineers begun in the April number of MUNICIPAL ENGINEERING is continued. Suggestions of additions, corrections and changes are invited from our readers for insertion in a supplementary list.

BIOGRAPHY (CONTINUED).

Smiles, S. Life of George and Robert Stephenson. London. Net, $2.65.

Smiles, S. James Nasmith (an autobiography.) $1.50.

Smith, G. B. Life and Enterprises of de Lesseps. Net, $2.65.

Stuart, C. B. Lives and Works of Civil and Military Engineers of America. $5.00.

Thompson, S. P. Faraday, Life and Work. $1.25.

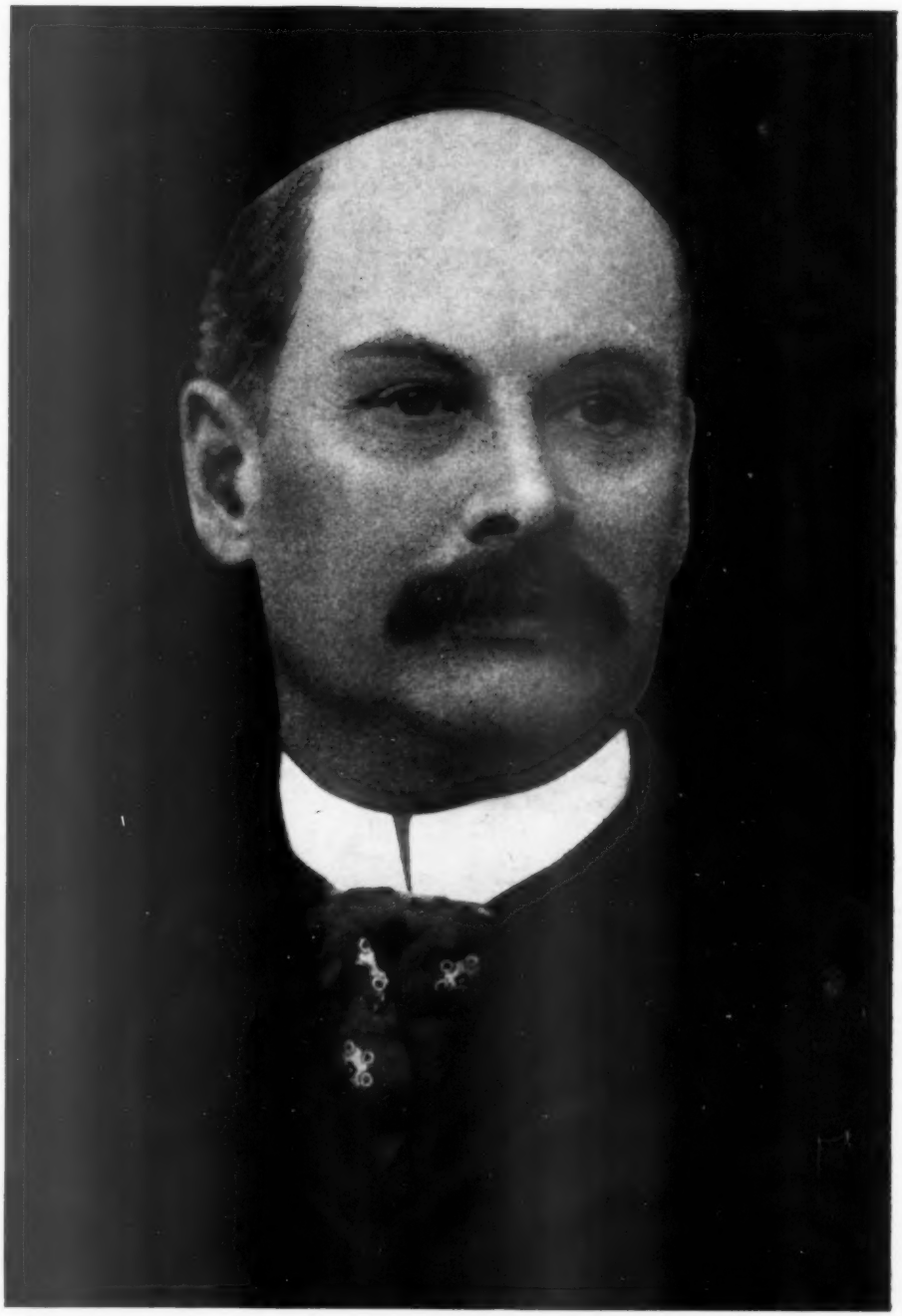
Trowbridge, J. Samuel F. B. Morse. Beacon Biographies. Net, $0.75.

Telford and Brindley; Their Lives and Engineering Triumphs. London. Net, $0.40.

Bessemer, Sir Henry. An Autobiography. 380 pp. 51 plates, 68 figures. $5.50.

CEMENT AND CONCRETE.

C. D. Reid, Homer A. Concrete and Reinforced Concrete Construction. 715 illustrations, 71 tables. Net, $5. Mainly reinforced concrete. Somewhat weak in theoretical portion.



XV. ELBERT H. GARY, VICE-PRESIDENT U. S. STEEL CORPORATION.

C. Lesley, Robert W., compiler. Concrete Factories. 152 pp.; many illustrations. 100 photographs with brief descriptions.

D. Leffler, Burton B. The Elastic Arch. 57 pp. 5 folding plates. $1.00. Special reference to reinforced concrete arch.

D. Meade, Richard K. Portland Cement, its composition, raw materials, manufacture, testing and analysis. 385 pp. 100 figures. $3.50. The latest and best book on the manufacture and properties of American Portland cement.

D. Buel, Albert W., and Hill, C. S. Reinforced Concrete. 499 pp., many illustrations. Net, $5.00. Good theoretical discussion, many practical examples.

C. Rice, H. H. Concrete Block Manufacture. 152 pp. $2.00.

C. Rice, H. H., Torrance, W. M., and others. The Manufacture of Concrete Blocks and Their Use in Building Construction. 122 pp., illustrated. Net, $1.50.

D. Brayton, Louis F. Brayton Standards, a pocket companion for the uniform design of reinforced concrete. Leather. 110 pp., illustrations and tables. $3.00.

C. D. Taylor, W. Purves, Practical Cement Testing. 320 pp., 142 figures. Net, $3.00, postpaid. Author is in charge of Philadelphia Testing Laboratory.

C. D. Warren, F. D. A Handbook of Reinforced Concrete. 271 pp., 34 figures and diagrams. Net, $2.50. The least satisfactory of the books on this subject.

CHEMISTRY.

C. D. Bayley, T. Chemists' Pocket Book. Flexible morocco. $2.00. Tables, data and formulas for use in the chemical industries.

C. D. Blair, A. A. Chemical Analysis of Iron. Net $4.00. A complete account of all best known methods for the analysis of iron, steel, pig-iron, iron ore, limestone, slag, clay, sand, coal, coke and furnace and producer gases.

C. D. Blount, Bertram & Bloxam. A. G. Chemistry for Engineers and Manufacturers; Chemistry of Manufacturing Processes. With illustrations. Net. $4.00.

D. Brearley, H., and Ibbotson, F. Analysis of Steel Works Materials. Net. $5.

C. D. Brown, W. L. Manual of Assaying; Gold, Silver, Lead and Copper. New edition $2.50.

C. D. Davis, George E. A Handbook of Chemical Engineering. Illustrated with working examples and numerous drawings from actual installations. 2 volumes. Net. $15.00.

B. C. Furneaux, William S. Elementary Chemistry, Inorganic and Organic. Alternative course. Illustrated. Net. $4.80.

D. Groves, Charles Edward, and Thorp. William. Chemical Technology; or Chemistry in its Applications to Arts and Manufactures. With which is incorporated Richardson and Watt's Chemical Teechnology. 4 volumes. Net, $16.00. Vol. I. Fuel and Its Applications. By Mills, E. J. and Rowan, F. J. Illustrated. Net. $5.00. Vol. II. Lighting Fats and Oils by Dent, W. Y. Stearine Industry, by McArthur, J. Candle Manufacturer, by Field, L., and Field, F. A. The Petroleum Industry and Lamps, by Redwood, B. Miners' Safety Lamps by Redwood, B., and Louis, D. A. Illustrated. Net. $4.00.

D. Jervis, W. P. The Encyclopedia of Ceramics. Illustrated. Net. $6.50.

B. C. Lassar-Cohn, Dr. Chemistry in Daily Life. Popular Lecture. Translated by M. M. Pattison Muir. With 22 wood cuts in the text. Net. $1.50.

B. C. Lassar-Cohn, Dr. An Introduction to Modern Scientific Chemistry. Net. $2. In the form of popular lectures; suited for university extension students and general readers.

D. Leffman, Henry, Examination of Water for Sanitary and Technic Purposes. Illustrated. Net. $1.25.

B. C. Newth, G. S. Chemical Lecture Experiments. Non-Metallic Elements. Illustrated. Net. $2.00.

C. D. Newth, G. S. A Text-Book of Inorganic Chemistry. Illustrated. Net. $1.75.

C. D. Phillips, Joshua. Engineering Chemistry. London. Net. $4.50. A practical treatise for the use of analytical chemists, engineers, ironmasters, ironfounders, students, and others, comprising methods of analysis and valuation of the principal materials used in engineering work, with numerous analyses, examples and suggestions.

C. D. Prescott, Albert B., and Johnson, Otis C. Qualitative Chemical Analysis. Net. $3.50. A guide to qualitative work, with data for analytical operations and laboratory methods in inorganic chemistry. Sixth revised and enlarged edition, entirely rewritten. With an appendix by H. H. Willard, containing a few improved methods of analysis.

C. D. Remsen, I. Inorganic Chemistry. Advanced course. Net. $2.40.

C. D. Richter, Victor von; translated by Edgar F. Smith, Organic Chemistry or Chemistry of the Carbon Compounds. Edited by Professor R. Anschutz. Third American from the Eighth German edition. With illustrations. 2 volumes. Each, net $3.00.

C. D. Sadtler, Samuel P. A Hand Book of Industrial Organic Chemistry. Illustrated. Net. $5.00. Adapted for the use of manufacturers, chemists and all interested in the utilization of organic materials in the industrial arts. Contents: Petroleum and mineral oil industry; industry of the fats and fatty oils; industry of the essential oils and resins; the cane sugar industry; the industries of starch and its alteration products; fermentation industries; silk industries; vegetable textile fibres; textile fibres of animal origin; animal tissues and their products; industries based upon destructive distillation; the artificial coloring matters; natural dye; colors; bleaching, dyeing and textile printing.

C. D. Thorp, Frank Hall. Outlines of Industrial Chemistry. Revised and enlarged and including a chapter on Metallurgy by Charles D. Demond. Illustrated. Net. $3.50.

CIVIL ENGINEERING.

D. Baker, I. O. A Treatise on Masonry Construction. $5.00.

D. Buel, A. W., and Hill, C. S. Reinforced Concrete. 311 illustrations, 5 folding maps. Net. $5.00.

C. D. Comstock, Geo. C. A Textbook of Field Astronomy for Engineers. Illustrated. $2.50.

D. Gillespie, W. M. A Treatise in Surveying. Two volumes, $5.00.

D. Hayford, John F. A Text Book of Geodetic Astronomy. Illustrated. Net. $2.50. Comprising an elementary course of practice with instruments and a treatise upon the survey of public and private lands, prepared for use of schools and surveyors.

D. Johnson, J. B. The Theory and Practice of Surveying. Illustrated. $4.00. Designed for the use of surveyors and engineers generally, but especially for the use of students in engineering.

D. Ketchum, Milo S. The Design of Steel Mill Buildings and the Calculation of Stresses in Framed Structures. Illustrated. Net. $4.00.

D. Merriman, Mansfield. Elements of Precise Surveying and Geodesy. Illustrated. $2.50.

D. Merriman, M., and Jacoby, Henry S. A Text Book on Roofs and Trusses. Illustrated. $2.50. Part II. Graphic Statics Illustrated. $2.50. Part III. Bridge Design. Illustrated. $2.50. Part IV. Higher Structures. Illustrated. $2.50.

D. Nugent, P. G. Plane Surveying, $3.50. A text book and reference book for the use of students in engineering and for engineers generally.

D. Patton, W. M. A Practical Treatise on Foundations. $5.00. Explaining fully the principles involved. With descriptions of all the most recent structures, accompanied by numerous drawings; also an accurate record of the bearing resistance of materials as determined from the loads of actual structures.

D. C. Pence, William D., and Ketchum, Milo S. Surveying Manual. A manual of field and office methods. Illustrated. Net. $2.00. For the use of students in surveying.

D. Prelini, Charles. Tunneling: A Practical Treatise. 150 diagrams and illustrations. Net. $3.00.

D. Raymond, W. G. Plane Surveying. Net. $3.00.

D. Root, E. A. Military Topography and Sketching. Net. $2.50.

D. Waddell, J. A. L. De Pontibus. A Pocketbook for Bridge Engineers. $2.00.

C. D. Wait, John C. Engineering and Architectural Jurisprudence. $6.00. A presentation of the law of construction, for engineers, architects, contractors, builders, public officers, and attorneys at law.

D. Crandall, Charles L. Text Book on Geodesy and Least Squares. 329 pp. 102 illustrations. $3.00.

D. Howe, Malverd, A. Symmetrical Masonry Arches. Natural stone, plain and reinforced concrete. 170 pp., 4 plates, 29 figures. $2.50.

C. D. Homans, H. W. Stadia Diagram. Sheet 22½ by 28½ inches. $2.50.

C. D. Buel, Albert W. General Specifications for Steel Railroad Bridges and Structures. 61 pp., diagrams and tables. Net. 50 cents.

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# EDITORIAL COMMENT

**Municipal Control of Public Service Corporations in New City.**

**Who Shall Choose Paving Material for Street.**

**Municipal Statistics.**

## MUNICIPAL CONTROL OF PUBLIC SERVICE CORPORATIONS IN NEW CITY.

In this number of MUNICIPAL ENGINEERING will be found a description of some of the engineering features in the construction of the new city of Gary, Ind., which is under construction *ab initio* upon the sandy south shore of Lake Michigan. In the number for May, 1906, will be found a statement of the principles upon which Mr. A. F. Knotts, the first manager of the Gary Land Company, through which the United States Steel Corporation is building the city, proposed to base the treatment of the public services, such as gas and electric light, water and street railways. In general his idea was that companies should be formed for the ownership and operation of these plants, but that their franchise should be such that their business success or failure and the reasons therefor can be determined by the proper authorities and the rates for service can be changed from time to time so that full compensation will be received for the use of the capital invested and at the same time the service shall be rendered at the lowest possible cost.

The government of the municipality has been started under the state law with a board of three town trustees, who are presumably competent men engaged more or less closely in the building of the city, most of which is being done by the subsidiary corporations, particularly the Land Company, formed under the direction of the Steel Corporation officials. The article of last May, above referred to, says that it was the intention to prevent as much as possible speculation in town lots, property being sold at set prices under restrictions as to character of and time of making improvements. The company has of course been obliged to build many houses to prepare in advance for the known necessities of the case, but it was understood that these would be sold under similar restrictions and at figures which would only reimburse the company for its outlays. Undoubtedly the expense of the sewers, paving and sidewalks will be included in the prices for the property, no method of assessing the cost of these services being applicable as yet.

According to recent newspaper reports the methods of operating the public service industries are possibly not to be as nearly ideal as the preliminary statements of Mr. Knotts would indicate. As stated in the article upon Gary elsewhere in this number, Mr. Knotts has resigned his position of responsibility as manager of the Land Company, and shortly after comes the report in the public press that franchises are proposed which are quite the opposite in theory of those proposed by him. The report is as follows:

The franchises sought are: Street car service to the Gary & Hammond Traction Company for fifty years over all the streets and alleys in the town, work to begin within three years and silent as to the fares to be charged as well as the transfer system; electric light franchise to the Gary Heat, Light and Water Company for twenty-five years with a proviso that the contract then will be renewed for a like term unless the city elects to buy at a figure to be fixed by arbitration; street lamps, to cost the city $75 a year, but no charge specified for private consumers; company given three years to begin work; gas light, either natural or artificial, to same company for the same period and a like proviso to purchase, street lights to cost the city from $28 to $21 a year each, according to the number of hours in use; no rates provided for domestic or individual use; right granted to lay the mains both in the streets and alleys; water system to the same company and for the same term of years as in the electric light franchise and with a like purchase provision; rates to city on hydrants $50 a year each for the first seventy-five and $40 for each additional one; no other rates specified and the company is allowed three years to lay its mains.

These franchises were brought up for consideration and action by the town board of trustees on April 20, and they are reported to hesitate over the terms as being too unfavorable to the new city.

It will be unfortunate if the greed of the controllers of the capital to be invested in these plants is such that they will exert the power which they undoubtedly have at this stage of the city's development, to prevent the proposed municipal supervision of the public service industries as to their financial as well as physical operations. The certain development within a short time of a city of known minimum population, gives an element of safety to the investment in these plants which should make the fixing of capitalization and rates easy and

the consequent returns for the money invested certain and ample. The present practical control of the city or town government by the same interests involved in the development of these public services should make the fixing of terms of contracts easy. The only difficulty is to be found in the tendency of those who control both sides of a contract to fix its terms to their own personal advantage. The conditions are most favorable for a thorough test of unadulterated municipal control of public service industries, and the securing of data for comparison with the present system of granting franchises almost without limit on the one hand and municipal ownership on the other. We hope that the experiment may be tried. Municipal control, on account of the pressure of local interests upon the municipal authorities to whom the control is delegated, is theoretically not so satisfactory as control through a central state bureau, which can also be more certainly made up of experts, but the latter is not now possible in Indiana and the experiment must be made under local control if made at all.

## WHO SHALL CHOOSE PAVING MATERIAL FOR STREET.

A prolific source of difficulty in beginning a paving improvement is found in the choice of the material which shall be used. The property owners in most cities pay for the pavement or the larger part of it and are therefore disposed to think that they should have the selection of the material. This is sometimes carried so far as to submit the question of the terms of the specifications for materials and methods of making foundations as well as surface to the vote of the property owners interested. In some cities it is impossible to make paving improvements to any great extent because the property owners cannot agree upon all the details and those who are opposed to paving are able to play one against another in such way as to prevent any paving. In many cities the same result is reached because the promoter of one kind of paving, being unable to secure a majority for his material is able to prevent any other material obtaining a favorable decision. The ordinary taxpayer is not an expert on paving materials, and cheapness or first cost is likely to interest him more than anything else, especially in a city where there are few pavements and he has happened to know some high priced pavements which did not fulfill the promises of their promoters. Durability is another feature which is attractive. Occasionally a man will have a special prejudice in favor of a certain kind of pavement and no other will answer his purpose. The fitness of the paving material for the conditions on the particular street seldom has any real consideration. Direct financial inducements are too often the source of the opinions of taxpayers regarding the merits of a particular pavement.

There are two sides to the question. One is the technical side, which should be wholly in the hands of competent experts, such as the city engineers and boards of public works are presumed to be, and the other side of personal preference, where the property owners should have an opportunity to express their opinions, subject to the control of the technical matters by the experts. The real question therefore is how much, if any, power of choice should be given to the property owner and when it should be exercised.

Where the board of public works determines the whole matter the advice of property owners is usually received and considered and followed as nearly as the demands of the situation and the policy of the board permits. There are but few cities in which a pavement can be laid by a board without recourse.

At the other extreme, usually in small cities and towns whose government is influenced by the "town meeting", and the city engineer is but little more expert in paving matters than other citizens, specifications are thrashed out in detail and are finally a compromise (probably bad) of the views most strongly expressed. The true method, lying somewhere between, gives the property owner, or at least the resident property owner some voice in determining whether his street shall be paved and within limits with what it shall be paved.

The first limitation is to give the property owners the general choice of pavement, leaving the preparation of specifications with the city officials in charge of such work. In some cases this choice is expressed by petition, a majority or, sometimes, a plurality indicating the pavement to be laid. This petition may be made as the first step in the procedure; may be made after an improvement resolution or ordinance has been passed, giving the limitations, if any, within which the choice may be made; or may be made after bids have been received upon various kinds of pavement, so that the property owner has before him the cost of each kind of pavement as well as the qualities. There are difficulties in too strict a limitation of the right of petition. Thus the restriction of a petition for a brick pavement to a particular kind of brick, if it must be followed, makes that brick a monopoly and may materially affect the price. In many states this is

not possible under constitutional or statute provisions governing and defining monopolies. Likewise the restriction to a single material which can only be procured from a single source may affect the price, though if it is a standard form of paving material in common and successful use it may escape the provision regarding monopoly in some states. At first sight the method of receiving bids and making choice afterward would seem to be excellent, and it would, were all the voters on the question sufficiently expert or not to be influenced by the wiles of interested parties. A cheap street may carry the day because of its cheapness, specious arguments based on partial information may put in a poor material at a high price, but the opening for undue influence is the most objectionable feature in this method. For example: A contractor bids on several classes of pavements, on some one or more of which he finds himself low bidder. He selects one of these materials and secures by the methods at hand a majority vote for this material. A combination may be made between two contractors whereby the favorable vote is secured, when the lowest bidder drops out. Some man with influence among the voters secures a following which holds the balance and sells out to the highest offer, etc. All this "graft" is outside the city officials, but it ultimately adds to the cost of the pavement and is also an inducement to recover the cost in some way from the work itself by inducing or taking advantage of lax supervision.

Another restriction is to give the board or council the right to determine the kind of pavement which shall be laid, the property owner having the right only to prevent the laying of the pavement if he can secure a petition of a majority of the property owners. This method is excellent in that it gives the technical authorities full power to determine the technical matters, and gives the property owners the opportunity to refuse the pavement if they do not want it. Where the board takes unofficial advice from the property owners before deciding upon the particular form of pavement, this method works exceptionally well, and results under a good board of public works in a well planned and well executed system of pavements with very few bad spots.

The power to vote in some cases is given to all property owners affected by assessment, in some only to those abutting on the street. The majority is counted sometimes in number of property owners and sometimes in frontage. The restriction of the voting power to resident property owners is an excellent provision in a progressive city, the non resident property owner seldom taking the same interest in the street improvement and being far more often opposed to it. This provision puts no restriction upon the board when there are no resident property owners, as in the case of a business street or a street in platted ground on which no houses have yet been built. It is well, therefore, to curb a board prone to let contracts for the benefit of hungry contractors by restricting improvements to those streets where the assessment will be only a certain reasonable percentage of the assessed valuation of the property, unless the city will assume the cost above this figure. On the other hand, if there is but a single property owner resident on a street he can block any improvement of it and the right of appeal of the board to the city council, under a provision of a two-thirds or other large majority, gives the opportunity to put through a necessary improvement without much chance of injustice.

## MUNICIPAL STATISTICS.

The annual numbers of the publications issued by the departments of statistics of Boston and Chicago have been received and are interesting in the evidence they present of the differences in ideas of municipal governments regarding what should be included in such a publication. Of the 34 tables in the Chicago publication and 41 in Boston about half may be considered as devoted to the same subjects. These include fire department statistics; two police department tables in Boston, elaborated and extended to six in Chicago; monthly mortality, contagious diseases, sanitary and food inspection and baths, which differ quite materially in items included in the tables and methods of classification; public schools and libraries, again differing in form and content; and commercial statistics, vessels in and out, imports and exports, flour and in the case of Boston, fish, and of Chicago, live stock and provisions; bank statistics.

Chicago's publication goes into considerable detail regarding collection of garbage, street and alley cleaning, with figures of cost, building, lighting, sewers, water supply, inspection, while Boston's gives meteorological observations, fuller tables of mortality and institutions population. The institutions of the cities differ so that the tables regarding them differ entirely.

Inquiries made of these volumes for items concerning which direct comparisons can be made are not very fruitful, even in the half of the tables which apply to the same classes of items. In the light of the many discussions regarding uniformity in collection of statistics in which

representatives of Chicago and Boston have been prominent, the extent of the lack of similarity in publications is somewhat surprising. It is true that not all the items needed in one city will find place in the other, but some careful consultation would certainly result in far greater conformity to some general standard than there is of these two with each other.

Chicago's collection seems to be upon the more practical basis, but there is some room for improvement and the outsider who wishes to obtain comparable statistics is in hard lines if these publications are his only source of information, however well satisfied he may be with his opportunities of tracing the development of the cities individually.

# THE QUESTION DEPARTMENT

## INVERTED SIPHONS FOR SEWERAGE SYSTEMS.

Will you kindly inform me through your question department where inverted siphons of considerable length have been used for sewerage and where published description of their design and construction can be found?

C. V. K., Janesville, Wis.

The inverted siphon at Roanoke, Va., is described briefly in MUNICIPAL ENGINEERING, vol. vi, p. 154, with drawings showing the plan and the peculiarities in the design. Some principles of design and a description of an inverted siphon design in Texas will be found in vol. xxii, pp. 93 and 168. Further discussion of the principles of design will be found in vol. xxi, p. 89, with references to siphons in the Boston and Buenos Aires sewer systems, and to fuller discussions of the subject in Folwell's "Sewerage" ($3) and Wood's "Practical Sanitary Engineering" ($2.50). Irving T. Farnham, city engineer, describes fully, on page 410 of the same volume, an inverted siphon in the sewerage system of Newton, Mass., which is about 245 feet long, giving drawings of the plan and details.

## INFORMATION ABOUT EGG-SHAPED SEWERS AND QUICKSAND FOUNDATIONS.

I should like references to sources of information about quicksand foundations and egg-shaped sewers, in MUNICIPAL ENGINEERING or elsewhere.

J. F. T., New York City.

Quicksand foundations are treated with more or less fullness in Fowler's "Ordinary Foundations" ($3.50) and Patton's "Foundations" ($5). Egg-shaped sewers are discussed in Adams's "Sewers and Drains for Populous Districts" ($2.50), Folwell's "Sewerage" ($3) and Moore's "Sanitary Engineering" ($10). The last two books consider handling of quicksand in sewer work, with practical details. Ogden's "Sewer Design" ($2) gives tables of flow in egg-shaped sewers.

Quicksand foundations are considered in the following articles in MUNICIPAL ENGINEERING: "Piling in Quicksand," vol. xxii, p. 25; "Mastering Quicksand in Sewer Construction," vol. xxi, p. 174; "Constructing a Sewer through Quicksand," vol. xi, p. 363.

Egg-shaped sewers are considered to some extent in the following articles, among others: "Some Details of Sewer Construction," vol. xxiii, p. 85; "Invert Blocks in Sewers," vol. xvii, p. 23, and vol. xvi, p. 244.

Colby's "Sewer Computer" ($10) is a slide rule which is a simple, easy and rapid computer of sizes and capacities of sewers, circular and egg-shaped.

## COST OF PUMPING SEWAGE.

Can you give me some idea of the probable cost of pumping by electricity small quantities of sewage, say one to two million gallons a day, lift not more than 12 feet?

D. O. N., ———, Ind.

In MUNICIPAL ENGINEERING, vol. xx, p. 24 and vol. xxv, p. 178, will be found some figures on pumping small quantities of water by various fuels and power. The cost per million gallons raised 100 feet varies from $8.80 for steam power with coal at $3 a ton to $16.36 with gas at $1 a thousand cubic feet, according to F. C. Coffin. Some figures by D. W. Mead showed cost by steam power to be $18 pumping 200,000 gallons a day or $10 pumping 1,000,000 gallons a day 100 feet high. By electricity the cost was made equivalent in this case to $16 per million

gallons 100 feet high. One-eighth the lift would cost more than one-eighth as much to pump so that $2 per million gallons 12 feet high would be a low estimate on this basis. The $16 rate is practically the same as the average rate at several sewage pumping stations operated from a central electric station at Sydney, N. S. W., with pumps of about 70 cubic feet per minute capacity and lift of about 93 feet.

## SPECIFICATIONS FOR CONSTRUCTING CONCRETE SEWERS.

Have you any work that has specifications for constructing concrete sewers?
D. O. N., Garrett, Ind.

The "Handbook for Cement Users" ($3) has specifications for plain and reinforced concrete sewers. The same and others will be found in MUNICIPAL ENGINEERING, vol. xxii, p. 19, vol. xxv, p. 182, vol. xxvii, p. 248, vol. xxxi, p. 398, and vol. xxxii, p. 164. The following are the paragraphs of the Indianapolis specifications regarding the construction of concrete sewers in general:

(1.) The concrete to be used in the construction of such sewers shall be supported by substantial and unyielding timber forms of the proper dimensions and shape, so that the concrete when finished will be of the thickness and the sewer of the dimensions shown on plans. All parts in contact with the inner face of the sewer shall be finished to a reasonably smooth surface. Forms shall not be removed in less than three (3) days after the concrete has been put in place without the consent of the engineer.

(2.) All concrete shall be composed of clean, screened gravel, not larger in any dimension than will pass through a ring one and one quarter inches (1¼) in diameter; clean, sharp sand and Portland cement mixed in proportions of one (1) part cement, two (2) parts of sand and four (4) parts of gravel by measure; a natural mixture of one (1) part of cement and five (5) parts of gravel and sand may be used if approved by the city civil engineer.

The gravel must be free from earth or other foreign matter. The sand must be free from earth or loam or other objectionable matter, sharp and not too fine. In mixing the concrete, if the work is done by hand, the cement and sand shall be first thoroughly mixed in a dry state on a tight platform in proportions specified above, and thereafter made into a mortar. The gravel, after being thoroughly drenched with water, shall then be deposited into the mixture and the mass thoroughly mixed and turned over until each stone is covered with mortar; the batch shall then be deposited in the work without delay, then thoroughly rammed until all the voids are filled.

The concrete shall be put in place in a moderately wet condition, in layers not over ten (10) inches in thickness, each successive layer being well rammed.

In connecting old concrete with the new, or one section with another, the section previously placed shall be thoroughly wet and then slushed with pure cement; this must be done immediately in advance of the new work.

## GARBAGE FOR FUEL.

Has anything been done in this country outside of municipal plants in the use of garbage as fuel?
P. L., Washington, D. C.

It is quite impossible to use garbage as a fuel for any purpose except to burn itself, and even this is difficult and frequently impossible. This statement uses the term garbage in its usual technical sense, meaning the refuse from kitchens and like places, composed mainly of decomposable animal and vegetable matter, usually wet. The other domestic wastes are divided into two classes, combustible refuse and ashes, such dry incombustibles as bottles, glass, crockery, etc., failing into the ash bin. Venable's "Garbage Crematories in America" ($2) shows the American tendency to separate wastes into all three of the above classes, or at least into two parts, and the consequent difference of the American problem from the English problem, where all three are collected together. The consequence is that there are no places in this country where garbage, whether alone or mixed with other refuse, is used for fuel, except to generate heat to dry itself before it can be burned. Branch's "Heat and Light from Municipal and Other Waste" ($3), shows the same state of affairs, although he shows how the combustible refuse can be used for fuel if the garbage is kept separate and disposed of in some other way.

## FLUSHING WITH WATER UNDER PRESSURE.

When examining pavements of different kinds in different cities during the past ten years, I have noted many of them seriously injured and some destroyed by flushing with water forced down upon them or diagonally across them, direct from hydrants, or from attached hose, or from flushing wagons from which water issues under compressed air. The injury and destruction is not only done by erosion on the surface of several kinds of pavements, but by means of water penetrating through joints and small openings and thus getting under the pavement as a whole or under the blocks of streets paved with bricks or stone blocks. An illustration of the pow-

erful effect of water thus penetrating is as follows:

Take an average paving brick 8x3x4 inches deep. It has 24 square inches on its under side. If water at 60 pounds per square inch penetrates below the brick, a theoretical hydraulic lifting pressure is developed of 24 times 60, which is 1,440 pounds under the brick. Allowing for escaping water and loss of pressure so that only ¼ of this is effective pressure, we have 360 pounds under the brick, weighing only 9 pounds, as this as the average weight of paving brick of block size. The brick is retained in place only by cement mortar or grout around it. There are many pavements without this cement and even if present it is not perfect at all points and many bricks become loosened, especially those which are constantly jarred by traffic and which are near street rails. Thus water applied from hydrants and flushing machines constantly lifts paving bricks from their bed and loosens them, aiding in the steady destruction of the pavement as a whole. This injury is also done to asphalt and other monolithic pavements. The small particles of sand or other component grains of the pavement are tiny paving stones between and under which tiny particles the water under pressure works its way. Engineers and those interested in street paving have but to bear in mind what I have stated above when they are looking at pavements in St. Louis, Chicago and other cities, which pavements are constantly flushed and seriously injured by the hydraulic effect of water thus improperly used in cleaning them.

J. W. HOWARD,
Consulting Engineer on Pavements, New York City.

Some of our readers will not agree with Mr. Howard concerning the seriousness of the danger to pavements from the excessive pressures, unless the water is seriously misused by the street cleaners. Supposing the water pressure at the nozzle where it is delivered to the air to be 60 pounds, which is probably somewhat above the average, the pressure exerted when the water touches the brick surface is materially less. If the stream is directed against the surface at the best angle for cleaning it, the component of this pressure perpendicular to the surface will be but a small fraction of the 60 pounds. This pressure acts mainly upon the surface of the pavement to keep it down. For any part of it to act upward, there must be openings in the joints or in the surface to let the water in, and time for vacant space to fill, and then there may be a slight lifting effect, partly counteracting the downward pressure on the top of the pavement. In a block pavement this action would apparently be very slight unless the nozzle were placed quite close to the pavement and the water directed perpendicular to the surface. Open joints in the pavement would increase the effect, but not very materially.

There is undoubtedly a strong washing effect of the water, which carries off loose particles of brick, filling, or asphalt as the case may be. This may wash out the joints in a block pavement and thus cause more rapid wear and will carry off loose particles from an asphalt street which would otherwise be kneaded into the surface by traffic and extend somewhat the life of the pavement.

Serious displacement of blocks must certainly mean serious errors in the manipulation of the stream of water and washing out of the bed or cushion beneath. The responsibility for such action must be laid on the operators of the cleaning system and not on the system itself. The objections to the washing effect can be diminished by proper operation of the stream of water. Whether they can be removed entirely will depend upon the thoroughness with which the work is done and the intelligence and carefulness of the operators.

Will our readers give reports of their experience with street washing by means of machines or hose and their observations of the effect upon the durability of pavements?

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## DIRECTORY OF GYPSUM TRADE.

I have a party who has one of the best gypsum propositions in existence, and who is desirous of getting in contact with parties or companies proposing to construct plants. Is there such a thing as a book or directory devoted to gypsum, plaster of paris, etc., which would give the desired information?

S. T., Roswell, N. M.

The only directory of the gypsum or plaster trade known to the writer is in the first three editions of the "Directory of American Cement Industries" ($5), which contains lists of plaster manufacturers and dealers in lime and plaster. The directory of machinery for cement manufacturers and cement users contains names of manufacturers of plaster making and using machinery also.

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## ACCELERATED TESTS FOR CEMENT.

Please give me the method of making the hot test of cement.

P. F. C., Sioux Falls, S. D.

The accelerated or hot test of cement is made as follows, according to the instructions of the American Society for Testing Materials, printed in the "Handbook for Cement Users" ($3):

Pats about 3 inches in diameter and ½ inch thick at the center, and tapering to a thin edge, should be made upon a clean glass plate about 4 inches square, from cement paste of normal consistency. One or more of these pats may be exposed in any convenient way in an atmosphere of steam above boiling water, in a loosely closed vessel. The pats should remain firm and hard and show no signs of cracking, distortion or disintegration. Should the pat leave the plate, distortion may

be detected best with a straightedge applied to the surface which was in contact with the plate. The pats are allowed to set under a damp cloth for 24 hours and then are boiled for 6 hours. In some specifications the pats are set on a frame in the boiling water, above the bottom of the vessel. In others, they are kept in the steam above the water, on some sort of frame. Occasionally a specification requires 24 hours' boiling.

## CEMENT BRICK.

Where can I get information as to the cement brick industry, if such there be, and the machinery or molds now on the market for their manufacture?
C. K., Columbus.

The cement brick industry is a branch of the cement block industry, and many of those making cement blocks also make cement bricks. Some of the makers of cement block machinery also make cement brick machinery, and there are several special makers of brick machinery and molds. Those prominent in the brick machinery trade are listed in the "Business Directory" published in each number of MUNICIPAL ENGINEERING, under the headings, "Cement Brick Machinery," "Cement Molds," "Concrete Blocks," and "Concrete Construction Machinery." Not all those under the last named heading are in the brick machine trade, but many of them are.

## INSURANCE RATES ON CONCRETE BLOCK BUILDINGS.

What rulings are made by insurance companies as to the rate given on buildings erected of concrete blocks?
R. C. C., Rockford, Ill.

There is no uniformity of rates upon concrete block buildings. The rates are fixed in the various districts, apparently without consultation of the authorities of different districts, so that while in a majority of cases the rates are the same as for brick buildings, they vary from this to 25 or 30 per cent. higher, and in an instance or two 40 per cent. higher. There is little real improvement since the article on this subject in MUNICIPAL ENGINEERING, vol. xxix, p. 121, from which the above information is taken. The reason for the variation in rates in 1905 was the ignorance of the rate-making authorities of the new material and the determination of some of them to make the rates high enough to cover any feeling of uncertainty they might have.

There were no results of experiments or experience at that time which would warrant a definite ruling, and it was then expected that series of experiments would be carried out which would give the information upon which to base an exact classification of concrete blocks as fire-resisting materials. These experiments have not yet been completed, but most of the exposures of concrete blocks to fire in the last two years have shown that they are at least equal, and, if good blocks, are superior to brick in fire resistance. Some of the experiments that have been made have shown rather unsatisfactory results, while others have been satisfactory. These results reduce the question to one of quality of blocks. If the blocks conform to a certain specification they are satisfactory; if they depart too far from it, they are not satisfactory. This specification has not yet been formulated exactly, but tests are under way which will furnish the required data upon which to base it.

Finally, therefore, the insurance rate on concrete blocks should be based on conformity to a standard specification, which should be incorporated in the building ordinances.

The building ordinances of a number of cities have been published in MUNICIPAL ENGINEERING, as stated and listed in the March number, on page 166, but, in the absence of the results of the experiments above referred to, these ordinances are only approximations to those which will ultimately be formulated. If such ordinances are adopted, however, they will form a good basis for a demand for recognition of the value of concrete blocks for building purposes and the granting of insurance rates at least equal to those on good brick buildings, if not better.

## GRANITOID PAVEMENT.

Will you kindly advise me what granitoid pavement consists of? Also, would like to know its composition. That is, the number of pails of each substance it contains. C. N., Escanaba, Mich.

A granitoid pavement is simply a cement walk. It first received its name, "granitoid," from the use of crushed granite as the aggregate, more particularly in the wearing surface, but the term is now applied in many cities to cement walks in which no granite is used. The usual proportion of the wearing surface of granitoid pavements, as specified in St. Louis, is one part Portland cement and one part sharp screenings of crushed granite, which is placed on a base of one part cement and three parts crushed granite. In other cities gravel is used in the base instead of granite, and in some cities the proportions in the wearing surface are one part of cement to one and one-half parts of the granite screenings.

## BOOKS ON REINFORCED CONCRETE DESIGN.

Any tables for reinforcing concrete you may have would be gladly accepted.
M. O. B., Marengo, Ia.

"Brayton Standards" ($3) has tables and diagrams for calculating dimensions of reinforced concrete slabs, and giving all the properties of such slabs for various spans, thicknesses, size of reinforcement, etc.; properties of wire and rods; bending moments and moments of resistance, and shear for beams of various kinds of reinforcement; strength of reinforced columns, footings, etc., and also discusses forms and mixtures of concrete.

Taylor and Thompson's "Concrete, Plain and Reinforced" ($5), also contains tables for the computation of slabs and beams.

Hawkesworth's "Reinforced Concrete Design" ($2.50 net) gives graphical diagrams for designing slabs, beams and columns for various conditions of loading, span, etc.

## CONCRETE BURIAL VAULTS.

Please give me the name of some system of making burial vaults of cement.
H. H., Gulfport, Miss.

L. L. Parry, Mansfield, has a system of making burial vaults which seems to be based on good principles.

## CONCRETE BRICK FOR STREET PAVING.

Our city is preparing to pave the streets. Will concrete brick do for that purpose, and have they been tried? If so, where, and with what results.
P. C. Co., ———, Ky.

The writer does not know of any trial of concrete brick for paving purposes, although there are one or two patents on such form of construction. Concrete street pavements have been in use in Bellefontaine, O., on the main business streets, for over fifteen years, and have given reasonably good satisfaction. They have been in use for shorter periods on streets of light traffic in Richmond, Ind., Grand Rapids, Mich., Toronto, Ont., and New Orleans, La. Descriptions of all these pavements will be found in back numbers of MUNICIPAL ENGINEERING, and some of them in the "Handbook for Cement Users" ($3). They are made under much the same specification as a heavy cement sidewalk or driveway, and are cut through in blocks, larger than brick, but smaller than sidewalk blocks. Complaint was made of slipperiness on the large blocks first used in Belelfontaine, and grooves were afterwards cut to make the blocks smaller and give better foothold to horses. If concrete blocks are well made of the strongest cements and are properly laid on a good foundation, the experience with the concrete paving laid in place indicates that the block pavement will give satisfaction so far as durability is concerned, though it is likely to be slippery. A pavement of concrete with rougher surface is being developed, which may reduce this objectionable feature.

## REINFORCED CONCRETE CONDUITS.

The Amsterdam Board of Water Commissioners are contemplating building a 12½-mile water conduit line. They have had submitted to them for their approval two 3-foot lengths of 30-inch reinforced concrete pipe. The board desires information from you where to send one of these lengths of pipe to have an impartial test made as to whether or not it would be perfectly water-tight and as to what water pressure it will sustain. Any information you can give us, or the address of any competent person you can name, will be highly appreciated. Also, can you tell us where a conduit line of reinforced concrete is in use, how long, what size, and whether or not it is giving perfect satisfaction? We also desire to get all the information possible upon reinforced concrete for water-carrying purposes, and we would also appreciate very much letters from your readers who are familiar with reinforced concrete for water conduit purposes.
F. T. H., Amsterdam, N. Y.

Some college laboratories are prepared to make the tests desired. Possibly Columbia University, New York City, or Cornell University, Ithaca, N. Y., are properly equipped. A list of commercial testing laboratories, some of which are prepared to make tests of the nature described, will be found in the "Business Directory," printed in each number of MUNICIPAL ENGINEERING, under the heading, "Testing Laboratories."

In MUNICIPAL ENGINEERING, vol. xxix, p. 353, will be found some descriptions of tests of reinforced concrete conduit pipes of 5 feet diameter, from which 70 feet is deduced as the maximum head to which such pipe of this diameter should be subjected. In vol. xxv, p. 364, will be found a description of the 60-inch reinforced conduits of Newark, N. J., which carry a maximum head of about 45 feet. In vol. xxxi, p. 182, is a report of a test of three reinforced concrete pipes, laid and jointed, which carried 35 pounds pressure (about 80 feet head), without leakage, and showed some leakage, not at the joints, under a pressure of 40 pounds.

Will our readers report their experiences with reinforced concrete pipes under pressure?

See the article on "The Testing of Clay and Concrete Pipes" elsewhere in this number for some data regarding strength of plain concrete pipes.

## EFFECT OF FROST ON CONCRETE PIPE.

In your last issue a question was asked regarding effects of freezing on concrete pipe. We have made some experiments this last winter with freezing tests on concrete drain tile. One test was made with a 6-inch concrete tile and a 6-inch clay tile, both being placed in a trough and water poured in so that the tile laid in 5 inches of water; then were then placed outside the building and frozen solid. In the morning we found the clay tile cracked on the top a quarter of an inch, and when the water was thawed, we then found two other cracks at the bottom, which had laid in the water. The concrete tile was not injured in the least. Another test was made by a man in this vicinity who lays tile for a living. There was a thaw this last March, which enabled him to dig a trench in the ground about 8 inches deep; he then laid a 4-inch concrete tile in the trench, filling same half full with a mud slush, then stopped the ends up with boards, and then covered the tile and ditch with a mud slush. The same night it froze hard, and remained frozen for several weeks. When it thawed out he examined the concrete tile and found it as perfect as when first placed in the ditch. We have had a number of concrete tile piled in our yards this last winter, that have been covered with water, some being half full of water, and they show no ill effects of the freezing.

F. A. B. PATTERSON,
Pres. Fairmont Stone Mfg. Co.,
Fairmont, Minn.

## CRUSHED MARBLE—FLOOR-POLISHING MACHINE.

Where can we purchase crushed marble for terrazza floors and machines for polishing the same? Also, give information as to the method of construction.

R. A. S., Guelph, Ont.

Marble dust manufacturers nearest our correspondent are Samuel H. French & Co., Fourth and Callowhill streets, Philadelphia, Pa.; Rutland Fire Clay Co., Rutland, Vt.; Stearns Lime and Stone Co., 165 East Randolph street, Chicago, Ill. The marble producers in Gouverneur, N. Y., Rutland, Vt., and elsewhere may be able to furnish crushed marble also.

Makers of floor and mosaic polishing machines are the Ransome Concrete Machinery Co., 11 Broadway, New York, and F. R. Patch Manufacturing Co., Rutland, Vt.

## CONCRETE FLOORS FOR BRIDGES.

Where can I get specifications for putting on concrete floors on bridges and using expanded or reinforced steel?

I. W., Walkerton, Ont.

Use Taylor and Thompson's "Concrete Plain and Reinforced," ($5); Buel and Hill's "Reinforced Concrete" ($5) and the "Handbook for Cement Users," ($3). Write also to the dealers in reinforcement. For example the Expanded Metal and Corrugated Bar Co., St. Louis, Mo., issue a publication giving much detail in this line.

## QUALITY AND USES OF MARBLE.

Inclosed please find chemical analysis of stone that we have on White River railroad in Arkansas. There is a mountain of it, which has no stripping, and is only 50 feet from main track. Please let me hear from you as to what you think of same. W. H. K., Jefferson City, Mo.

The analyses referred to are as follows:

I. LIGHT GREY MARBLE.

| | Per Cent. |
|---|---|
| Silica | 1.95 |
| Iron & Aluminum Oxides | 8.32 |
| Lime (CaO) or quick lime | 49.72 |
| Magnesia | .94 |
| Carbon Dioxide, by difference | 39.07 |
| | 100.00 |

II. LIGHT RED MARBLE.

| | Per Cent. |
|---|---|
| Silica | 4.95 |
| Iron & Aluminum Oxides | 9.35 |
| Lime (CaO) or quick lime | 47.47 |
| Magnesia | .93 |
| Carbon Dioxide, by difference | 37.30 |
| | 100.00 |

This marble will make a splendid building material and on account of the small percentage of magnesia it can be used for the manufacture of high-grade Portland cement.

They are referred to such of our readers as may be interested. A convenient deposit of clay of proper quality would make cheap Portland cement possible. The analysis hardly gives indications of the value of the stone for building purposes, as the physical characteristics must be definitely known and they may vary materially while chemical analyses vary but slighdly.

## HAND POWER GRAVEL AND SAND SCREENS.

Do you krow of maker of revolving screen that could be worked by hand and give me sand that would pass through a No. 8 mesh and gravel from this up to ⅝-inch? J. W. B., Hoopeston, Ill.

Possibly the Jeffrey Mfg. Co., Columbus, O., or the Chicago House Wrecking Co., 35th and Iron streets, Chicago, Ill., can supply the desired apparatus. John O'Laughlin, Racine, Wis.; Harrington & King, 210 N. Union St., Chicago; Atchison Perforated Metal Co., 330 Dearborn St., Chicago, and Tyler & Co., E. St. Clair St., Cleveland, O., also make screens, and may have hand machines. Can our readers give any information?

## CAUSE OF AND REMEDY FOR RAPID WEAR OF CEMENT FLOOR.

The question of L. C. P., Lancaster, Pa., in last issue: What to do with a cement floor that dusts and wears off. Lack of moisture while setting, no doubt caused the trouble.

Can a new finish be put on the old base, that will unite and be permanent?

If the base is good material it can be done. Remove the finish and clean thoroughly by washing, and while wet, sprinkle dry cement sufficient to lightly cover the work; run top on quite wet.

If the conditions produce rapid evaporation, it is better to cover with some kind of canvass and keep wet for a couple of days. I had a piece of concrete that had lain for over one year that when finished, was a complete success.

JAMES THOMAS,
Tacoma, Wash.

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## REMOVAL OF EFFLORESCENCE FROM CONCRETE SURFACES.

I will be pleased to receives a method of removing alkali from artificial stone.
F. S., Pasadena, Cal.

The subject of efflorescence on concrete surfaces is treated in some detail in the "Handbook for Cement Users" ($3) and various methods of preventing and removing it are described. If the efflorescence cannot be brushed off or washed off by a jet of water it can be removed by a wash of 1 part hydrdchloric acid and 5 parts of water well scrubbed on and immediately washed off with a stream of water from hose. This will not prevent reappearance of the alkali at intervals until it has all been dissolved out of the face of the stone.

The following is from a practical block maker giving his experience and is of interest in this connection as being his observation and his interpretation of what he has seen:

"In our first experience, we had the whitish deposit that comes to the surface of the stone or brick. By giving it a thorough study, we find that it all lies in the curing. The reason you notice the white more in the cold weather than you do at any other time, is on account of the moisture in the atmosphere. When a block or stone has not been properly cured and the whitish deposit has started on the outside surface, the more dampness and moisture it receives the more it will show the white on the outside. It can be washed off with pure rain water and muriatic acid, mixed about one part of acid to twelve of water, but after it gets a soaking it will appear again. It is a very hard matter to stop after it has begun to show itself. If it is left alone it will gradually disappear after a year's time, and I think this the best way. But if the stone are properly cured on the start, this whitish deposit will never appear on the surface. Nine-tenths of people making stone, when they begin to spray or sprinkle driwn the stone on the very start. Stone should be sprayed very lightly as soon as the stone have there initial set or as soon after as it is convenient, then increase as they get older. Never soak them if you do not want the white to show. After spraying them always wait until the stone or brick begin to be their natural color. Never spray or sprinkle when the stones are wet. You will find by following these instructions that you will drive the white to the center of the stone, instead of the outside surface, and you will get just as good a stone as you can by drowning them. A dry process must be watched very closely to get good stone, but we find again that the wetter the process the less care it requires, and the better stone you get. By using what we call a medium process, your stone are not so porous. It makes more of a glazed finish on the outside surface and the stone is almost perfectly crystallized on the inside as soon as they are 24 hours old, and do not need very much water after they are made. We have buildings of our own make in Manitoba, North Dakota, Montana, Minnesota, and Michigan, that have never shown any of the white deposit since the day they were built. In brick we always use a dry process, but in our stone we always use the medium process, that is about 20 per cent wetter than the dry. Some people say that it is more expensive than using the dry, but we average every day at our factory, with two men molding, 30 stone every hour."

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## PAVING STREET WITH STREET RAILWAY TRACKS.

Would you please give me a little information in regard to the best method of treating a street with a railway in it? I am putting concrete under bed of roadway—that is, putting a concrete base over entire street for vitrified blocks.
S. B. J., ————————, Md.

A street railway track is always a source of weakness in a pavement, and should be as thoroughly solidified as possible. This can be done first by thoroughly draining and solidifying the soil underneath; second, by putting in a spreading foundation under the ties so as to distribute as much as possible the weights coming on the ties, this foundation to be of broken stone or, preferably, of concrete; third, by putting in concrete under the rails and the pavement so as to make a continuous bed for them. If the rails are deep, 7 or 9 inches, the usual 6-inch concrete foundation for a block street will come but little below the rail flange. If 5-inch rails are used, there will be 5 or 6 inches of concrete below the rails. In any event, but especially with the lighter rails, there will be more or less vertical movement of rails between points of support on ties, unless the rails are

laid on solid foundation throughout, and such movement will tend to displace the blocks next the rails. Perhaps the most successful attempt to reduce this tendency is the use of special shaped blocks with a nose to fit under the rail flange and rest against the rail web. Reference should be made to the article in this number on "Paving Between Street Railway Tracks and Rails."

## T-RAILS IN PAVED STREETS.

I understand that there is in Indianapolis quite a large amount of T-rail track in paved streets. I am anxious to know if they are giving satisfaction and what is thought of the construction by the general public there. How does a block pavement last alongside of these rails? What is the special construction used next to the rail in a brick paved street? What foundation is used under the pavement and under the track? We are considering this construction here for streets to be paved with brick this summer. H. P. CUMINGS, Cy. Engr.
Painesville, O.

The city of Indianapolis and the street railway company have agreed, after much experiment, that the best pavement of the street railway's part of the roadway, between rails and eighteen inches outside, is brick. There are a few streets where interurban cars use the tracks, which are laid with T-rails. A special shape nose brick is used inside the rails, to give a groove for the flanges of the car wheels of the interurban cars, which are wider than those of the ordinary street cars, also on the outside of the rail. The construction seems to be quite as satisfactory as any that has been used, and the block pavement is quite as durable as along any other form of rail. Concrete foundations are used under ties and pavements so that there is as little vertical movement of the rail as possible. This is the important consideration in designing a permanent street paving in the street railway tracks. The specially formed bricks are aids to prevention of displacement, but are not of much value without the solid foundation.

The construction is described in a paper elsewhere in this number, which was presented by Mr. B. J. T. Jeup, formerly city engineer of Indianapolis, before the Indiana Engineering Society.

Other cities using T-rail to greater or less extent are Ottawa, Can.; Denver, Col.; New Haven, Conn.; Terre Haute, Ind.; Davenport, Ia.; Cambridge, Mass.; Minneapolis and St. Paul, Minn.; Kansas City, Mo.; Amsterdam and Schenectady, N. Y.; Columbus, Dayton and Delaware, O.; Erie and Scranton, Pa.; Tacoma, Wash.; Milwaukee, Wis. The expressions of opinion by city officials and street railway officials in these and in other cities where the T-rail is not used differ quite widely. The T-rail is favored by some city and railway officials and is quite as strongly opposed by others in both classes. The special construction described in Mr. Jeup's paper seems to remove most of the objections. A T-rail is apparently very objectionable in an asphalt or other continuous pavement, but a brick or other block pavement can be so constructed alongside a T-rail as to be entirely satisfactory. Interurban cars have deeper wheel flanges than city cars and a T-rail is much more economical for their use, wear not requiring so early replacement of the rails. The old contest between flat and grooved flanges has no place in this discussion, although the change from grooved rail to T-rail is probably more satisfactory than from grooved rail to flat-flanged rail. In a recent paper, Mr. F. L. Ford, city engineer of Hartford, Conn., expresses the opinion that the grooved rail will be most popular in city systems of the east and south, where snow and ice do not interfere and where street pavements are narrow, while in western and northern cities with wide pavements and more snow and ice, the T-rail will be preferred. He might have added the effect of interurban cars in influencing the decision in favor of T-rails on the streets over which such cars are permitted to run.

## WHO HAS A SECOND-HAND LEVEL?

I would like to be put on the track of a good second-hand engineer's level.
I. J. S., City Engineer, ————, Ia.

Will our readers who have such instruments to dispose of, send us descriptions of the same?

## INK FOR STAMPING ON TRACING CLOTH.

We are very desirous of learning of some type of ink which can be used in connection with a pad and rubber stamp for placing a stamp on tracing cloth. We would appreciate it very much if you could give us some information in regard to any manufacturer making an ink that will do this work or if you can suggest a formula whereby we can mix it up ourselves. We have tried several different kinds of ink and have never yet found anything that will give a clear-cut print and still retain those quick drying properties, so essential to an ink for this work.
W. K. P., Kansas City, Mo.

With metal type "combination black," made by the Jaenecke Printing Ink Co., is used in the Ockerson method of printing topography and on tracing cloth the letters are dusted over with talcum powder. The A. S. Aloe Co., of St. Louis, Mo., have a special printing ink which is said to give good satisfaction also. We are indebted to Mr. J. A. Ockerson, C. E. of St. Louis, for this information.

### GAS EXPLOSION IN PUMP PLUNGER.

Several days ago, our employees were making repairs to a five million gallon Knowles duplex pump in the Toledo water works pumping station and it was necessary to remove one of the pump plungers.

About five minutes after the tail rod had been removed, one of the men used a candle so as to see to place a rope sling on the plunger to pull it out of the cylinder. When he got within about one foot of the plunger with the candle there was an explosion which burned the back of the hand in which he held the candle quite badly. One other employee, who was a little farther away was burned about the head and face and one hand.

The pump was erected in 1884 and I do not know that the plunger has ever been out or opened since that time. This plunger was perfectly tight as there was not a particle of water in it.

As we are unable to decide what caused the explosion, we would be glad to have you give your opinion.

J. M. WISLER, Supt. Waterworks,
Toledo, O.

This occurrence is one which seems to be outside the experience of engineers in general. Suggestions have been made of the collection of gas in the chamber which had been occluded in the iron, gradual seeping through the iron or the joints of gases formed by the decomposition of organic matter in the water, and sealing up of gas in the chamber when the pump was put together, but the most plausible theories advanced are one of the formation of gas in sufficient quantity to produce explosive mixture with the air in the chamber, by chemical change in a small quantity of oil which may have found its way into the chamber during the process of construction, this oil having probably evaporated completely before the chamber was opened; and the other of the gradual forcing of water through the iron from which the oxygen was taken to form an oxide of iron, leaving the hydrogen to enter the inside of the plunger. Have the chemists among our readers anything to offer regarding the two latter theories and have any of our readers any information about similar occurrences?

# ROADS AND PAVEMENTS

**Reducing Dust—Paving Street Railway Tracks—Steaming Timber.**

## Reducing Dust and Hardening Roads by Surface Applications.

BY J. W. HOWARD, C. E., NEW YORK CITY.

At the convention of the American Road Makers' Association held in Pittsburg March 13, 1907, Mr. J. W. Howard, a consulting engineer on roads and pavements in New York, was invited to read a paper on the treatment of road surfaces and the following extracts from his address properly bear the title to this article:

The road problem involves, among other things, the first cost of construction, cost of maintenance by constant small repairs, periodic light surfacing with a fine material, general surfacing with coarse material, cost of cleaning, expense of horses for traction of loads over hard or smooth as compared with soft or rough surfaces; expense of wear on harness, vehicles; effect of wet, dry, cold, hot and windy weather; injury from mud and especially from dust, to food products in transit, and to the clothing, comfort, health and wealth of persons using the roads or dependent upon them—nearly every person everywhere.

It is the road dust problem which is now receiving the attention of the best engineers and road makers in all civilized countries. The Germans say "Staub friszt"; the French "La poussiere ronge"; we say "Dust eats." Yes, it eats goods and destroys wealth and carries germs of consumption, pneumonia and worse diseases and destroys health.

It is not necessary to describe what produces the dust of roads, as it is known to all. The agencies which cause dust to rise are natural winds, passing vehicles, and automobiles, which also by the suction under their tires lift dust out of the road material itself.

Suppression of road dust has become a necessity for health and wealth, because of the damage it does to goods, crops, real estate values and the rapid raveling of the road itself.

This paper is confined to the treatment of earth, sand, gravel and macadam roads by surface applications only. When population is dense or where traffic is numerous, it is more economical and efficient to lay some form of pavement more durable and cheaper to maintain than mac-

adam, such as stone blocks, bricks, bitulithic, etc.

The following are the general methods in use for reducing dust. Each method more or less retains or agglomerates the dust already formed or prevents its formation.

1. Sprinkling roads with fresh water.
2. Sprinkling roads with natural salt water.
3. Sprinkling roads with mixture of water and calcium chloride.
4. Sprinkling roads with mixture of water and saponified oil.
5. Impregnating roads with special crude oils.
6. Impregnating road surfaces with special coal tar products.

SPRINKLING WITH WATER.

This is too expensive for thousands of miles of roads. Water sprinkling is only a temporary help. Where done continuously it costs more than any of the other methods.

SPRINKLING WITH SALT WATER.

This can be done only when the ocean is near. It is more effective than fresh water, because the salt accumulates on the road and retains moisture. The accumulated salt, when dry, hurts throats and eyes, damages clothing, furniture and to some extent the feet of horses. It is a natural mixture of water and sodium chloride and is thus related to the next method.

SPRINKLING WITH WATER AND CALCIUM CHLORIDE.

The principle of this method is that this salt is hygroscopic and when mixed into the road surface (by means of having it in solution in the water of the sprinkling cart) it absorbs additional water from the atmosphere. It also has a feeble chemical action which unites some of the silicates of the macadam. To produce the best results on macadam requires about three pounds per gallon of water. One test required three sprinklings the first month and two each succeeding month, or about 0.9 pound of calcium at a total cost of $0.066 per square yard, to which add labor of mixing with water and the sprinkling, about $0.04, making a total for good work about 10 cents per square yard for an average season of nine months.

A test in England, a moist climate, required one sprinkling the first month and one about every two months thereafter and used three-fourths of a pound per square yard, and three-eighths of a pound for each subsequent treatment of the road. Another test on a road exposed to sun and wind required about two pounds per square yard the first day, 1.2 pounds the second day, and 1.2 pounds every third or fourth week thereafter to lay the dust. This same substance, possibly modified, seems to be sold under the name "Akonia." Calcium chloride method is a temporary help at a few points, but expensive and out of the question for general use.

SPRINKLING WITH A MIXTURE OF WATER AND SAPONIFIED OIL.

This is practically a mixture of water, oil and alkali (as ammonia or potash); practically a liquid soap.

There are several patented or proprietary compounds on this principle; one is called "Sandisize," patented and tried in Scotland. It consists of grease from wool washing and some potash. There is also a patent "Dustroid" in England, which has been tried and which is believed to be on the same principle. Another compound, seemingly of the same nature, for mixing with water in sprinkling wagons, is known as "Westrumite." A trial of this material was made in South Park, Chicago, in 1905; a 5 per cent. solution was sprinkled every eight days. It required .17 gallon per square yard and cost $0.0064 per month, or $0.0512 per square yard per season of eight months. On the same road water alone cost $0.00415 per month, or $0.0313 per square yard for season of eight months. This cost included everything except the water, free for sprinkling in Chicago, but would have been added in most places.

Another compound of oil and alkali, called "Pulverite," was tried on the Auverne roads in France and irritated the skin, throat and eyes.

"Rapidite" is another French compound of asphalt powder and water, like a thin mortar on the surface; but is of doubtful value. All these soapy compounds are of but temporary benefit, but have their use on gravel and macadam in a limited number of places. But where climate is as variable and distances are so great and labor is so high, as in America, we must seek substances for laying dust which last longer and need attention only at long intervals.

IMPREGNATING ROADS WITH SPECIAL CRUDE OILS.

The application of certain oils to roads practically began in California in 1894, when crude oil from Summerland oil wells was used on the Ortaga Road, five miles from Santa Barbara. It was sprinkled to lay the dust of the soft soil of the road. A slight hardening of the road was observed from the repeated applications of the thick maltha or asphaltic oil. A few other roads in California were sprinkled until about 1900, when the use of its oils on roads rapidly extended

from the many oil centers in that State, until today oil is used for suppressing dust and hardening roads, with varying success and failure, in about forty counties of California to an extent of a little more than 2,056 miles. California and other crude oils are now being used experimentally to a limited extent in other States and in Europe. Persons who have not seen the peculiar local California conditions, as its climate, long dry season, roads of dry volcanic or alluvial dust, sand, clay and loam, and roads made of these, saturated with the peculiar maltha or thick, sticky asphaltic oils, must not assume that they can use those or other kinds of crude oils in the same way and with the same results on other kinds of roads, with heavier traffic and in climates with rain at short intervals and frosts in winter. California crude oils and others, with marked exceptions there and elsewhere, contain maltha or soft asphaltum and resemble thick sticky molasses. Such oil is almost a liquid asphalt and when heated and spread upon certain soils, clay, sand or gravel mixed with such soils, will impregnate or can be harrowed into such roads. They are then rolled and compressed by traffic and will consolidate and form a pliable crude asphaltic crust. Oil must be applied at intervals thereafter and no water must get into the yielding subsoil under this weak bituminous or asphaltic crust.

Let us glance at a few actual records of oiling roads. In Contra Costa County, California, some macadam roads were oiled with 12 to 18 degree Beaume oil, costing 65 cents per barrel, and applied to the road cold, cost about $75 per mile. It was not satisfactory. It does not help macadam as much as more absorbent soft roads.

Kings County, California, has about forty miles of oiled sandy roads. Large stretches became ground up and give off dark dust. It is necessary to constantly oil these roads to such a degree that wheels and horses throw up the surface and occasional rains wash away the oil and road. Still, it is better than no oil, because it hardens the sand and permits faster travel and heavier loads.

In Sacramento County, California, I noted several gravely, clayey and sandy loam roads and a little macadam. The thick, sticky oil helps all these by suppressing dust and conserving the road. But do not expect to find there as clean, smooth surfaces as are found in many States having better constructed roads from better materials.

Probably the best constructed and maintained oiled road of California is the driveway of Golden Gate Park near San Francisco. The oil when cold is between 14 and 16 degrees Beaume. It was heated to about 300 degrees Fahr., sprinkled while hot on the road, men followed closely and stirred the oil into the road with rakes. The road, of course, was first properly graded and shaped. Its surface was made smooth, then soaked with water to loosen it. It was next well dried to a depth of at least 1 inch and the oil applied as stated during warm, dry weather. Repairs are constantly made by promptly sweeping out any little hole that forms, putting in a little oil, adding gravel and stone dust to absorb the oil and tamping until firm. The oil costs 72 cents per barrel, and 400 barrels per mile of 16-foot road were first applied. Since then 300 barrels per mile have been applied twice each year, or

J. W. HOWARD, C. E.,
New York City.

600 barrels per year. The tendency is to form into ruts and to a slight lowering of the whole road surface. This last is caused by rain water working through the surface and carrying away the road material from under the asphaltic oil crust. Although expensive, it is so important a drive out of San Francisco that it is worth all it costs.

Kentucky oil was used in Fayette County, Kentucky, about 1904, 1905 and 1906. At least three oilings were needed the first year, at cost a little more than 6 cents per square yard. At least one oiling per year for light travel, costing about 3 cents, and two oilings per year for numerous travel, at about 5 cents, will be needed. It is too soon to report on the efficiency and economy of this oil and work.

Near Jackson, Tenn., during 1905, a crude oil was used with a flash point

169 degrees Fahr., specific gravity 0.92. It was applied to a road 18 feet wide and covered about one-half mile. The labor cost $0.0057 and I estimated this crude oil, f. o. b. station Jackson, would cost with profit about 7 cents per gallon. Thus 0.48 gallon per square yard would cost $0.0336. The total cost of oiling, therefore, was about $0.393 per square yard for one application. The oil soaked into the macadam, left no coating on top and when examined seven months later it was of no permanent benefit to the road and had ceased long before to suppress dust. The process should have been repeated at least three times the first year and twice per year thereafter.

A heavy residuum oil left after evaporating the lighter oils was also tried near Jackson. It had a flash test of 308 degrees Fahr. and a specific gravity of 0.97. The labor applying this heated oil cost $0.0078. I estimate the cost of 0.71 gallon per square yard at 7 cents per gallon to be $0.0497, making a total of $0.0575 per square yard for one application, including cleaning the macadam and spreading sand on top of the heavy residuum oil. When examined seven months later, a layer of compacted dust about one-eighth inch thick remained, while some of the road surface had been washed and some blown away. This surface should have received a second treatment within the first three months and probably two per year thereafter. Then some conclusion would be possible on what now appears not to be a success.

Liverpool, England, in 1902 and 1903 tried an oil on some suburban macadam and found that it cost less than constant water sprinkling; but the kind of oil used made the surface of the road oily and slimy in dry and more so in wet weather and of offensive odor. Its use was stopped, as well as that of previously used calcium chloride solutions in watering carts. The solution pleased them better than oil, but proved too expensive for suburban and country use.

### GENERAL RULES FOR OILING ROADS.

I learned from California practice that the crown of a road of soft materials (for it is doubtful if any crude oil really helps macadam) to be oiled must be high and its sides well drained, because water with or without freezing floats much of the oil or gets under the oiled crust and softens it. The hotter the oil when applied, the warmer the weather and dryer the road, the better. When heating crude oil allow for an expansion of 15 per cent. Heat it between 225 to 300 degrees Fahr. Use oil of 14 to 16 degrees Beaume and containing at least 35 to 50 per cent of thick maltha or liquid asphalt, not over 3 per cent of foreign matter and water and the balance 62 to 47 per cent should be light bitumens, some of which should oxidize and some evaporate from the freshly oiled roads, leaving an elastic, dustless crust of road material and heavy parts of the oil. Oiling by hand is expensive and not uniform, especially when it must be done by the mile. Special machines for oiling, harrowing, spreading sand, etc., are to be had, although still imperfect.

In California, according to soil, from 175 to 400 and sometimes 600 barrels (of 42 gallons each) of asphaltic oil are needed per mile of 10- to 16-foot road per year. Two or three treatments are needed on a new road during the first year if the road is of a loamy or sandy nature. After a road in California has been well oiled and a crust is formed, care must be taken not to break through the crust. Prompt repairs are imperative. Do not flood the road with oil. Better use several successive applications. An excess of oil on a road is disagreeable and will injure paint of vehicles, harness, clothing and seems to affect rubber tires.

Road materials, which if wet would pack firmly under roller or traffic and still remain slightly porous, are the materials which are the best for use by saturating with suitable thick adhesive oils. Such oils suppress dust and harden such a road. Road materials of certain clays, earths, gravels, which when wet pack tight or bake in the sun and which pulverize into dust, must be either loosened up by harrowing or otherwise made porous before being oiled, and then must be covered with sand, screenings or the material of the road. Oiling roads is a case where a little knowledge is dangerous, and where much knowledge and experience must be employed to select suitable oils and to use them correctly.

In regard to the suppression of dust by means of oil, it is impossible to prescribe any formula. There are a great many kinds of oils produced by nature. The naptha or light oils of Russia, and the paraffin oils of Pennsylvania, Ohio, and elsewhere will not do and I doubt if any of their products can be successfully and economically used. The Texas, Kentucky and Kansas oils and some others may possibly be used if specially prepared or applied in special ways. The California maltha or asphaltic oils are successful with the loamy, sandy and alluvial soils in that and like climates, but not yet with macadam. Transportation is likely to prove too expensive for those and other suitable oils elsewhere than near their sources of production. The use of crude oil is a local question

for each place and requires careful investigation and the best of advice before undertaking its use; also careful supervision when used and instruction as to prompt repairs.

IMPREGNATING ROAD SURFACES WITH SPECIAL COAL TAR PRODUCTS.

The use of coal tar and its products as ingredients of pavements and roads has been undertaken in many ways for about fifty years, but with no success until quite recently.

It is used in the general group of pavements called tar macadams, composed of hot crushed stone and specially prepared tar or bituminous cement, mixed while hot and compressed in place. Of this group that which is known as bitulithic pavement seems the most successful for streets and in lighter form. I believe it is known as bitrock for suburban roads and the interior of villages and small towns.

We must know the difference between a tar macadam and tarring a macadam road. A tar macadam, as stated in general, is a mixture of heated crushed stone and specially prepared adhesive tar cement, mixed by machinery, spread and compressed. The best type of a tar macadam at present is the one devised by the late F. J. Warren. He made it clear that not only his pavement, but all macadam pavements should have voids between the larger crushed stone so filled with smaller and smaller broken stones that they mutually sustain themselves in position as a solid mass and do not depend upon the adhesion of the tar product or any binding substance to hold them in place. The cement acts simply as a final filler of small pores and a waterproofing material within and upon the macadam.

The tarring of a macadam road means sprinkling, painting or covering its surface with a soft tar specially prepared for that purpose, and which will penetrate the macadam and make it waterproof and retard the formation of mud and dust. A prepared tar which is sufficiently fluid to lay dust and penetrate the surface of the macadam can not be a binding material to hold together any portion of that macadam, except the finest particles and dust.

Specially prepared coal tar, by surface application on macadam to eliminate dust and make the macadam waterproof and more durable, first succeeded in Melbourne, Australia, in 1886, where the experience gained has been followed by constant use ever since. Tar freed from water and very light oil and otherwise improved is used. The macadam is first well bonded and consolidated, then tarred and fine stone screenings are spread. Coal tar products are suited only to hard macadam and similar roads, because it is not practical and economical to use these products on soft earth, clay and sand roads. The cost would be too great, sufficient tar is not available, it would not harden. It is better and cheaper, where obtainable, to use suitable asphaltic oils on soft and absorbent roads, as is done in California.

Near Fountainbleu, France, the road to Paris was tarred during 1903, 1904 and 1905. The cost of repairs and renewals is less than by the old methods without tarring. The repairs to the macadam itself are reduced to about one-fifth of what they were. The tarred surface produces little dust.

The Vendee District, France, based on records begun in 1896, shows as follows: One highway 20 feet wide was tarred in the following manner: The macadam was put in good condition, well rolled and used by traffic for a month; then thoroughly cleaned by stiff brooms, followed by fine brooms. Hot tar was spread over the macadam. It percolated down into the macadam, the work being done in warm weather with the road very dry. It penetrated 1 inch in four hours, and 1 2-3 inch in twenty-four hours. The first tarring required about 1.9 pounds per square yard. Twelve hours after tarring each section, clean sand was spread. The surface was then rolled and opened to traffic.

One year later the operation was repeated, using less tar, because the road would absorb less; then every second year thereafter. The road was practically free from dust, its wear was reduced to about one-half and the total cost of the road in ten years was 40.4 per cent less than under the old system of maintaining the road in constant good condition with macadam only. This was due principally to the fact that the tar saved $1,430, which would have been paid out during the ten years for extra crushed stone and resurfacing, if the surface had not been tarred at intervals as stated. Tarring made it necessary to resurface with stone only once, not twice as formerly.

A second road in the same district properly tarred costs 23 per cent less on a basis of fourteen consecutive years than if it had been maintained with macadam only.

A section of macadam road near Paris, as per report of the Government Engineer Sigault, shows that the tarred section needed only one cleaning in the winter of 1902-1903, when 2 2-3 cubic yards of mud were removed from 1,131 square yards of surface of tarred section, whereas 32 cubic yards of mud were removed by

nine necessary cleanings from the same amount of surface of untarred macadam on the same road under the same conditions of traffic.

The Department of the Seine-et-Marne, France, which I have twice visited, shows that the expense of using special hot tar and using every precaution and all the skill possible, is warranted, and that the tar should not be applied to old, irregular macadam without first putting it in good order and having it thoroughly rolled and under traffic and weather for at least a month; also that newly constructed macadam roads should be thoroughly compacted by rolling and open to traffic and weather for a month or more before being tarred. Reliance is not here placed upon the tar used to bond the macadam together, but simply to agglomerate the fine particles in the small pores of the macadam and make its surface waterproof.

Near Liverpool, England, tar painting, as it is called, is used where the traffic is light. The macadam is first cleaned, then painted, then covered with grit, and allowed to stand two or three days to soak. It is then consolidated with steam roller and traffic admitted. This suppresses the dust and gives longer life to the roadway with acceptable hygienic and economic results.

Holyhead Road, England, was dried, cleaned carefully with horse brushes and then with hand house brooms; hot tar spread with special brushes; road covered with sand and traffic let in. The cost on low English basis of labor, tar, sand and heating was a little more than 2 cents per square yard per treatment. The treatment must be repeated twice the first year and once per year thereafter. The results are promising, but not yet conclusive.

The tests of tarring made in connection with the United States Government at Jackson, Tenn., in 1905 give interesting data for that locality. In addition to the quantity of special tar used (contributed free) and the cost of labor, I have estimated the cost of the special tar on the basis of the cost of Tarvia, which was the material used. The price of Tarvia there, I learn, would be 6½ cents per gallon f. o. b. works, plus freight. It is a specially prepared tar, free from water and light volatile oils, and of a uniform standard. It is not patented and can probably be made by experts. All costs considered, I estimate that the cost of 0.45 gallon per square yard and of labor, heating and sand, was an average at Jackson of $0.04012. Freight on tar and superintendence added, makes a total cost of a little above 6 cents per square yard for the first tarring. It penetrated about 1 inch into the macadam and at the end of seven months was in good condition. To remain constantly good it should have been retarred in 1906. Parts, however, were retarred in October, 1906, and when examined in January, 1907, were excellent. The road produces practically no dust, is waterproof and smooth.

Near Troy, N. Y., the State Engineer in 1906 tarred a section of road. He cleaned the road, spread hot tar, covered it with screenings, consolidated it with traffic and repeated the operation twice. He used special tar from which the water had been boiled off, and the result thus far is promising.

### GENERAL RULES FOR TARRING MACADAM.

I will indicate a few of the necessary principles to observe in tarring macadam. Before tarring, the macadam must be brought to grade and then filled with fine stone screenings, rolled and subjected to traffic about a month, or until consolidated and firm. The mechanical bond of the macadam should be as perfect as possible and not rely upon the prepared tar to do the binding as already described. Crude tars must not be used, as they contain water, ammonia and sometimes other objectionable substances, according to their origin from different coke ovens and from many kinds of coal. If crude tars are purchased, they must be prepared by the buyer. It is probably best to get one or more of the prepared tar products of which the one mentioned is a type, or some tar product which fulfills the physical and chemical proportion needed. These properties can be determined by an expert engineer familiar with them.

The work should be done only in warm, hot and dry weather. The macadam should be first swept clean and sometimes washed, but should be allowed to become perfectly dry to a depth of at least 1 inch before applying the tar product. The tar should be spread uniformly under competent supervision. It should be allowed to stand and percolate for at least several hours after being spread and then be covered preferably with sand or with uniform fine-grained stone screenings, containing no earthy matter nor dirt. The tar should be applied as hot as possible at about 200 degrees Fahr. After the sand or screenings have been spread, it is best to wait several hours before rolling with a steam roller. During the rolling additional sand or screenings must be added if any tar squeezes up through them. It is a good plan to keep traffic off of the finished rolled road for a short time after rolling. This is because the work is done in warm weather and it is wise to let the tar continue to

penetrate and become cool before opened to traffic.

Tarred macadam roads are being used in many parts of the United States and Europe, especially where firm macadam and gravel roads exist.

The mixing of crude tar and hard pitch is not a good method, nor does it make that which is necessary for properly tarring macadam roads. A study of sections of roads which have been tarred convinces me that the tar at the surface of the road is oxidized by the air and other elements and leaves the adhesive ingredients of the tar, such as anthracine, paraffin and napthaline, in the road surface, and the softer oils below remain to give life to the lower strata. Because this oxidation takes place the road is hardened and made more durable. In time, as stated, the tarring must be repeated to supply new life by adding small amounts at proper long intervals. It pays in every sense to keep tar-treated macadam clean, because accumulations of leaves and dirt, brought upon it, disintegrate the road, although not so much as ordinary macadam not tarred.

Each locality is a separate problem as to what available materials to use for constructing roads and what methods to adopt for reducing dust. My experience testing pavement and road materials in my laboratory and constructing pavements and road surfaces for many years in many places, convinces me that not cheap first cost, but economic maintenance is true economy. This applies also to suppressing dust. Water alone, or mixed with salts or with alkali and oil, has a very limited application. Certain adhesive asphaltic oils for soft road materials and specially prepared coal tar products for hard macadam and similar roads seem to be the present solutions of dust problems for thousands of miles of highways.

## Paving Between Street Railway Tracks and Rails.*

BY B. J. T. JEUP, C. E., INDIANAPOLIS, IND.

Most franchises granted in recent years to street railway companies contain provisions describing in general terms the kind of rail and the paving between the tracks. By the terms of the franchise granted to the Indianapolis Street Railway Company in 1899, for instance, the company agrees that "The tracks of the said company shall at all times be kept in repair, provided with the most modern and improved rail of sufficient size and weight," and the same franchise and contract requires the company to pave the space between the rail and the space of 18 inches outside of the outer rails with the same material and in the same manner as the remaining portion of the street, or to improve said space with other materials in accordance with specifications prepared by the Board of Public Works of the city. Owing to the improvements that are being made in rails and in the methods of track construction and in paving, the provisions in franchises covering the kind of rails are usually and naturally indefinite. This indefiniteness has, however, given rise to clash of opinions between street railway officials and municipal authorities as to the kinds of rail which comply with the terms of the contract and franchise. After years of controversy, opinions still differ as to the kind of rail best suited for our streets. To illustrate: In the *Street Railway Journal* of January 5, 1907, appears a discussion on "Track Construction and Other Improvements of the Tri-City Railways" (Rock Island, Moline, Ill., and Davenport, Ia.), in which appears the following:

As the city ordinances in all three of the cities did not permit of T rail construction, girder rails were at first employed in the new work. However, permission was obtained from the City Council at Davenport to lay 800 feet of double track with T rails in paved streets in order that the advantages and disadvantages of this construction might be observed. The location chosen for this strip of track was a point where it would receive the hardest usage from crossing wagons. It is interesting to note that within three weeks from the time permission was obtained to lay the strip of track, the T rails were ordered, were rolled and were on the ground. After a trial section had been in use for a few months and after frequent inspections had been made by members of the council, permission was granted to use T rails in all the new track work in Davenport. It is expected that permission will be obtained from the city authorities in Rock Island and Moline to use the same rails.

In the same number of the *Street Railway Journal* we read an account of a discussion of the rail question by J. L. Adams, general manager of the western division of the Indiana, Columbus and Eastern Railway Company, on the one hand, who advocated the use of T rails, and City Engineer Maetzel of Columbus and Fred L. Ford, city engineer of Hartford, Conn., on the other, who appeared for the city advocating the use of grooved rails. In Columbus the traction company is very firm in its determination to use the T rail on account of the greater safety in running its cars, so that the question of the kind of rails in Columbus will probably have to be settled in the courts. Here we see the municipal authorities of two cities arriving at diametrically opposite conclusions.

Without going into a history of the

*A paper before the Indiana Engineering Society.

development of the rails for street railways, it may be said that various modifications in size and shape have been made from time to time which have resulted in three prevailing types: First, the T rails, the rail used in steam railroad practice; second, the girder rail of a type shown by this section; third, the grooved rail, reaching its state of perfection, it is said, in the Trilby rail used in Philadelphia and weighing 137 pounds per yard. This grooved rail is, strictly speaking, a development of the girder rail. All of these three types vary in height and weight according to various practice. With the advent of large interurban cars into cities upon tracks of the street railway companies, much track had to be rebuilt, and much rail of the girder type became practically useless. I recall that on one of the lines in this city the interurban cars entered the city on the wheel flanges, and I remember seeing the tram of a comparatively new girder rail worn through in a very short time by the grinding action of the flanges of the interurban cars. The old type of grooved rail was found also to be useless for interurban cars with their deep-flanged wheels.

Railway companies advocate the use of a T rail, and the arguments they present in favor of this section over grooved rails are the following: First, less resistance to tractive force; second, ease of and better installation; third, long life of rails; fourth, greater safety to traffic; fifth, minimum track expense. In the above arguments the one that appeals to the city authorities is the safety to traffic. High-speed interurban cars have deep-flanged wheels. The tendency of the times in wheel construction of these cars is for the adoption of the M. C. B. flange of steam railroads. Serious danger has developed in operating these cars on city tracks where these tracks are of the ordinary girder type, or the old standard grooved rail. The railroad companies further object to the grooved rail on account of trouble in keeping the groove clean.

From the standpoint of a city, it makes little difference as to the kind of rail which is used where the streets are wide and where there is no teaming on the space occupied by the street railway tracks. But in cities where the streets occupied by street railway tracks are narrow, the municipal authorities rightfully demand a rail which offers the minimum obstruction to teaming, and which will cause the least derangement and deterioration of pavements along the rail, and at the same time a rail which will be safe for the traveling public.

In order to remove the objection made by this city to the ordinary form of T rail used by interurban companies, and to combine the advantages of both the T rail section and the advantages of the grooved rail, a method of construction was agreed on between the city and the railroad companies which I will describe. A heavy T rail section of special design was rolled weighing 91 pounds to the yard, heavier than is usually used for many of the steam railroad tracks. The depth of the rail is 7 inches. It therefore has the advantage of the rigidity and stability of a girder rail. A deep groove is formed by the use of a large nose block placed as a stretcher along the inside of the rail. The space between the nose blocks is paved in the ordinary manner with vitrified paving block in courses at right angles to the nose block. Vehicles turn out of the space between the rails as easily in this form of construction as out of grooved rails. There is some evidence of wear on these nose blocks, and as an improvement I would suggest a form of asphalt block of similar design and one which would have toughness rather than the brittleness of brick, and which would wear by matting rather than by chipping. The use of this heavy, deep T rail with a large nose brick is a construction which has met with the approval of a large number of engineers who have visited the city, and is a form of construction which has all the advantages of a T rail as ordinarily used and possesses such features of the grooved rail as are desired by city authorities.

For terminal tracks used by interurban cars, the best and heaviest construction is none too good. In this city such rails have been laid on Portland cement base, with concrete stringers, the rail being anchored to the concrete at intervals of 3 feet 4 inches, and ties being spaced about 10 feet apart for the purpose of maintaining the track in position during the laying of the concrete. In parts of this city where the tracks are used by the city cars and by one or two lines of interurbans, oak ties are used and the concrete is placed between the ties. We have many forms of paving construction in this city, asphalt between the tracks, with a stretcher of brick or granite on each side of the rail; a header of brick, with two stretchers of brick alternating; we have asphalt placed against the rail and against a Hayden block on the inside of the girder rail. With brick or stone block pavement, the practice has been in this and other cities to put in nose brick or nose block, or a cast-iron block on the inside of the rail, with the paving between the rails laid in courses at right angles to the rail. The paving of the 18-inch strip on the outside of the rail has been either of brick or stone

block, laid in courses at right angles to the rail, or in courses parallel to the rail. Some cities are still using wooden block between the tracks, laid in a similar manner to the method of construction with paving brick. The experience of this city is opposed to the use of creosoted wooden block, however well they may be treated, as a paving material between tracks. It is only a question of a short time until sufficient oil has exuded from the block to enable them to absorb water, when they swell and seriously interfere with the alignment of the track.

Sheet asphalt, in fact any sheet pavement, is, as a rule, very unsatisfactory for paving between the tracks, and has only given partial satisfaction with heavy grooved rail construction. It is now the generally accepted opinion that the paving between the track should be some form of block pavement, either brick or stone or asphalt block, a pavement which can be laid by the railroad company, which can be taken up and replaced by the railroad company when joints, ties, bonds, etc., are to be renewed. Such a pavement can be repaired more promptly when so directed, by the city, because the company need not await the pleasure or convenience of paving companies to make repairs. In this city brick is now almost universally used for paving the space between the rails.

I am of the opinion that a heavy T rail construction with a large nose block forming a groove, as before described, a block modified to remove some minor objections which have developed, together with a brick pavement laid on a well-built Portland cement concrete base, will be entirely satisfactory to city authorities on all streets which are to be permanently improved.

# COURTS AND LEGISLATURES

**Seattle Lighting Bonds—Sale of Municipal Plants—New Jersey Light Inspection—Laporte Water Plant—New York Highway System—State Revenue from Water Sheds—Firemens' Salaries—Peoria Sewer Ordinance—Selma Water Plant—Chicago Street Railways—Executive Boards—Municipal Legislation.**

## Seattle Lighting Bonds Valid.

The Washington supreme court decided that the $600,000 lighting bonds issue of Seattle is valid. The attorney general brought suit in the name of the state against the board of land commissioners to prevent the purchase by the board of the bonds as an investment for the state permanent school fund. The chief point raised in the proceedings was that the ordinance providing for the voting on the bonds was introduced at one council meeting, and passed one week later by the council. It was claimed that the law provided for but one meeting a month by the council, and that the second meeting was an adjournment of the first, which brought the matter within the inhibition that a special election ordinance must not be introduced and passed the same meeting.

The supreme court holds that the second meeting was not an adjourned meeting, and that anyway the question is not a vital one. The court holds that the questions "was proper notice of election given, and did the voters authorize the issue?" are the important ones.

## Law Affecting Sale of Municipal Plants in New Jersey.

The Bradley act, passed by the New Jersey legislature, while meant to prevent a possible sale of the waterworks of Camden, will apply to all plants that may be acquired by the city in the future, and especially to the electric light plant now under consideration. By the passage of the act cities hereafter will not be able to dispose of any municipal plant unless it is so decided by a four-fifths majority of the voters at a special election.

A special committee of the Camden council has submitted an estimate of the cost of the proposed electric light plant. It is believed there will be a bitter fight before deciding to arrange for the financing of the plant, which will require

from $130,000 to $180,000, the exact cost depending on the matter of conduits.

### Gas and Electrical Inspection in New Jersey.

A bill has been introduced in the New Jersey legislature providing that in first class cities there shall be established a department for the supervision and inspection of gas and electrical equipment under the supervision of the city board of health. This department is to have control and direction of the placing, establishing and maintaining in buildings of all electrical appliances. The board of aldermen shall appoint a practical electrician or gas engineer to have charge of the department for a term of one year, at such salary as the board shall fix.

### Investigation of New York Highway System Ordered.

A resolution adopted by the assembly at Albany, N. Y., April 16, provided for a special commission to investigate and report generally on the highway system of the state. An appropriation of $7,500 is provided for the commission to employ counsel and stenographers and to meet other expenses.

### Ownership of La Porte Water Plant.

A permanent injunction was granted recently by Judge McMahon in the Laporte circuit court to prevent the city of Laporte, Indiana, from paying money to the Laporte Water Supply Company. Judge McMahon held that the plant, which was built seven years ago and which has been in litigation ever since, is the property of the city.

The Laporte Water Supply Company was organized eight years ago when the city's indebtedness was close to the constitutional limitation, and an auxiliary water plant was later constructed at a cost of $100,000. The company issued bonds for $65,000, which were taken by the Northern Trust Company of Chicago. The city afterwards acquired all the stock of the company, except two shares. Under the franchise it began paying the company sufficient money to operate the plant and for the bonds and interest as they came due. Previous to this, however, E. H. Scott and other taxpayers had attempted to prevent the construction of the plant, but the lower court refused an injunction. Upon appeal the Indiana supreme court declared that the water supply company was organized to evade the constitutional limitation. As a result of this ruling suit was brought to prevent the city from paying the company money and Judge McMahon ruled that the city owns the plant regardless of any claims made by Chicago bondholders, who are suing in the federal court for a receiver and for possession of the plant.

### New Jersey Proposes State Revenue from Water Sheds Used for Water Supply.

As passed by the New Jersey legislature the potable water commission bill was so amended as to protect the rights of cities that have already acquired waterworks by purchase. This removes one objectionable feature of the measure as originally introduced. An effort had ben made to put the bill through with a provision that would compel municipalities to pay the state a fixed price for all water used in excess of 100 gallons a day per capita based on the present population.

The city of Newark would have been forced, had the bill been enacted into law as drafted, to pay the state for the difference between the amount at present used, about 40,000,000 gallons, and the total storage capacity on the city's watershed, which is about 70,000,000 gallons. As the city had already provided this storage capacity at its own expense, it would have been an unwarranted hardship for the state to have imposed a further burden upon the people in the city for their water supply.

### Salaries of New Jersey Firemen Fixed by Law.

A bill passed the New Jersey legislature which fixes the salaries of firemen in first class cities as follows:

Captains, $1,500 a year; assistant captains, $1,400; engineers, stokers, drivers, etc., not less than $1,000 each for the first year, not less than $1,100 the second year, not less than $1,200 for the third year, and not less than $1,300 for the fourth year. The act does not take effect until approved by the majority of the voters.

### Peoria Sewer Ordinance Valid.

Judge W. I. Slemmons of the Peoria County court on April 8 overruled all objections to the construction of the proposed fourth district sewer in Pekin, Ill. Counsel for the plaintiffs claimed that the ordinance had not passed the council of the city of Pekin in manner and form that it should; that the ordinance had not been submitted to the proper committees of the city council; that the ordinance had not been published in full and

according as the law prescribes; that the approximate cost of the proposed sewer or an itemization of the number of cubic yards of excavation were not given; that there was a noted variance between the estimate of the city engineer and the ordinance submitted relative to the materials to be used; that no special tax could be lawfully raised or levied for the proposed improvement because the land necessary for said improvement did not belong to and had not been acquired by the city of Pekin.

### Selma, Ala., Can Build Municipal Water Plant.

A decision rendered at Mobile, Ala., by Judge Toulmin of the United States district court in the cause of the Selma Waterworks company vs. the city of Selma denied the injunction asked for by the waterworks company, which sought to restrain the city from issuing $150,000 bonds for the purpose of building a municipal water works system. In asking for the injunction the water company alleged that under its contract, the city could gain control of the property, as the water company was willing to sell for a reasonable price. The city held that the price the water works company asked for its property was so high that they had not been able to reach any agrement.

### Chicago Street Railways Not Yet City Property.

Municipal ownership of the street car lines in Chicago received a setback, April 18, when the supreme court of Illinois rendered a decision making practically inoperative the Mueller law certificate issue. The legality of $75,000,000 worth of Mueller law certificates, which ex-Mayor Dunne wanted issued, was challenged and the court decided against the certificates. The Mueller law still stands intact, but the power of putting it into effect, so far as Chicago is concerned, has been taken away from it.

The court declared the proposed certificates invalid for the reason that they would be an addition to the bonded indebtedness of Chicago and the city is already up to its constitutional limit, which is 5 per cent of the value of its assessed property. Fault is also found with the certificates because they are a mortgage not only on what street car properties the city might acquire under them, but the streets of the city as well. The Mueller law provides that in case there is a default in the payment of the principal or interest of these certificates the owners of the properties, on foreclosure, not only would acquire them, but also a 20 year franchise to operate them.

Ex-Mayor Dunne's plan to acquire immediate possession of the street car properties by condemnation proceedings is made short work of by the decision. Neither a municipality nor any other corporation can condemn property without the cash in hand to pay for it, and the invalidation of the Mueller law certificates takes it out of the power of the city to raise the money.

The only possibility of municipal ownership of street car lines in Chicago is reduced, as the case now stands, to the following alternatives:

The city can buy up all its outstanding bonds so as to leave a clear field for the issuance of bonds with which to buy street car lines. At this time it could not issue more than $30,000,000 of bonds, and a traction system covering the whole city could not be built or bought for this.

It can save up the 55 per cent net receipts of the companies it will receive under the recently adopted ordinances until the total amounts to enough to buy or build a system. It can take what little money it can raise now and take over some small line, saving the profits of operation and whatever extra money it may have to spare for the extensions.

The legality of the traction ordinances recently passed by the council and approved by the people is not affected by the decision, but it makes them practically 20 year permits to run unless somebody is willing to pay a bonus of 20 per cent on the investment and the city will sanction the purchase.

### Executive Boards Provided for Paterson, N. J.

A bill passed the New Jersey legislature April 9, providing for the creation of a board of finance, a board of public works, and fire and police board for the city of Paterson. All of those boards are to be appointed by the mayor.

Another bill provides that all license fees derived from theatres and places of amusement in Paterson shall be paid into the firemen's pension fund of that city.

### Report of New Jersey Commission on Municipal Government Legislation.

A report of the commission appointed at the last session to inquire into the general system of municipal government in the state of New Jersey was transmitted to the legislature April 1 by Governor Stokes.

The commission stated that the report is incomplete owing to lack of time. A resolution was passed without dissent, extending the time of the commission and

allowing $2,000 for clerical work for the current year. The report is as follows:

Pursuant to joint resolution No. 8, approved May 22, 1906, in accordance with which the Governor was authorized to appoint three persons as commissioners to consider and report upon the whole system of municipal government in this state, your commission begs leave to report as follows:

The members of your commission recognize the importance of the duties imposed upon them by the terms of this joint resolution. The weightiest questions now under discussion by students of political affairs are those relating to the functions of municipal government. Methods of administration, the management of finances, tax rates and the amount and kind of local debts are topics now being considered by nearly every state legislature. The local government is nearest to the home of the individual. It performs for him much more tangible services than the state or the national government, and his interest in it should be paramount to all others. Events of the last decade have emphasized this fact. The recent concentration of population in urban centers has been accompanied by a great increase in the extent and number of the services which local governments must necessarily perform. This increase in the kinds and amount of public services and the increased cost of them has thrown an increased burden upon the taxpayers which has far outstripped the increase in either population or wealth.

In a very progressive city of great wealth which has spent money for improvements with lavish hand during the period of thirty years, from 1870 to 1900, population has increased 160 per cent., valuations or taxed wealth have increased over 110 per cent., while expenditures have increased nearly 225 per cent. and net debt has increased over 1,000 per cent. At the other extreme stands an extremely conservative city like Trenton, in which from 1876 to 1905 population increased 240 per cent., valuations increased 140 per cent., while expenditures increased 242 per cent. and net debt increased 300 per cent. The statistics of other cities are equally striking.

The old charters of local governments, most of them conferring narrowly defined and detailed powers, were totally inadequate to provide for the governmental needs of this rapid growth in population. The appeals to the state legislature for increased local powers have been for years as necessary as they have been unremitting. The statute books are filled with laws relating to petty affairs of local government, most of which the local authorities would have been fully capable of deciding upon and providing for, if those laws had been framed on such broad and general lines as to permit them to do so.

In this somewhat haphazard process of legislation, passed under pressure to meet immediate needs, the principle of home rule, so essential to all good government, has been almost wholly lost sight of. The forms of local government have become complex, cities of similar wealth and population have developed widely different methods of government and the laws have become so intricate as to confuse even the legal profession, while the average citizen finds himself almost totally unable to understand the details of the methods of management of local affairs. Too great an opportunity has thus been offered for the introduction of partisan politics into municipal management and the administration of local government upon a purely business basis has been correspondingly hampered.

The system of law-making under which this condition of affairs has grown up, is wholly wrong in principle and mischievous in practice. It may be accepted as axiomatic that local self-government will make but spasmodic progress as long as there is a lack of proper regard for the fundamental principles of local autonomy in state legislation. Your commission, however, believes that there is a remedy for these evils and that a long step in that direction can be made by the adoption of a municipal code, which on the one hand shall clearly limit the sphere of state activity and obviate the need of state interference in local affairs; and on the other hand, shall clearly mark the sphere of local government and provide that within that sphere the citizens shall be allowed to manage their own affairs in their own way.

In the few months which they have had to devote to this task the members of your commission have made some progress, but the work is by no means completed. In order to treat the subject with that care and thoroughness which it demands, and in order to finally recommend such changes in the laws affecting municipal government as will meet with general approval and at the same time have a degree of simplicity and uniformity which is essential to efficient and economical administration of public affairs, your commission has formulated the following plan of procedure:

First, to compile and collate the laws relating to those various forms of local government which can be grouped under the general class known as municipal corporations. There are now over nineteen hundred laws either partly or wholly in force relating to municipal corporations, and this number does not include special charters granted to cities and towns before the constitution was amended, in 1875 prohibiting the granting of such charters. Of these laws, probably seventy-five per cent. are special in their application, although they conform technically to the constitutional provision requiring laws to be general in their form. It not infrequently happens that some city or town asks for the enactment of a law which seems to be general in its application while in practice it will affect only the city in question, and that fact is urged as a valid reason for its passage.

Second, to prepare an analysis of the more important municipal codes which have recently been adopted in other states, the most noteworthy of which are the law of New York, applying to second-class cities, and the recently enacted municipal codes of Ohio and Indiana. The laws of some of the Western states, such as California and Wisconsin, under which local political bodies having a certain population are allowed practically to frame their own charters, and the more recent experiment in local government in Galveston by a commission of five, the members of which act both in a legislative and an administrative capacity, are striking examples of progressiveness which are very suggestive.

Third, to obtain information and suggestions from local officials and from those citizens in various localities throughout the state who have given the subject of municipal government some study and some of whom have already prepared forms of local charters.

The work of collating these materials in order to bring them into a comprehen-

sive and systematized form has thus far been done only in part. In the prosecution of this work, however, much time and labor has been saved to your commission through the courtesy of a commission now compiling the state statutes. The secretary of this latter commission has kindly placed at the disposal of your commission on municipal government the result of his compilation. In order to complete its work your commission would suggest that provision be made for a secretary who can give his whole time to the work of the commission.

With regard to the fiscal affairs of local government, however, your commission has reached some definite conclusions. It has already drafted some laws relating to this subject, but refrains from presenting them at this time because of the lateness of the legislative session. The importance of these laws is nevertheless so great that ample time should be given for their discussion and a synopsis of them is herewith submitted.

One—A law providing for a uniform fiscal year, which fiscal year shall begin either at the time when the general property taxes are due or at a time when, by a uniform system of rebates, general property taxes are paid into the local treasury. The object of this law is to bring into conformity the beginning of the fiscal year, both as regards the receipts and as regards expenditures. At present general property taxes are due on the twentieth day of December in each year and the great bulk of local income is paid either about that time, or is paid in advance in October or November because of the rebates granted for advance payments. The actual fiscal year from the point of view of expenditures, begins at various times in different municipalities, some beginning in January, some in February, and some on other dates. Partly in order to bridge over this period of time between the beginning of the fiscal year and the payment of general property taxes, which furnish the bulk of income for that fiscal year, local governments have been forced to borrow in anticipation of taxes. Nearly every municipality has some funded debt, in some cases amounting to hundreds of thousands of dollars, caused by funding a floating debt incurred in anticipation of taxes, which taxes have never been paid. Such a debt represents no permanent improvement and therefore should never have been incurred. A law providing for a uniform fiscal year, in which the period of income and the period of outgo shall run concurrently, should obviate the necessity for borrowing in anticipation of taxes, and should result in a simpler form of municipal book-keeping.

Two—A law limiting municipal indebtedness to seven per cent. of the ratables in cities of the first, second and third classes and to ten per cent. of the ratables in all other municipal corporations. In calculating the percentage of debt allowable, there should be included the local government's share of all county and local school debt, but deductions should be made for indebtedness incurred for the purpose of constructing a water plant and for all sinking funds, except sinking funds for water debt. In cases where the debt at present is in excess of the limitations proposed, special provisions can be made.

The laws now relating to indebtedness are vague and is some cases conflicting. The limitation is supposed to be fifteen per cent. of the ratables in boroughs and in some other municipalities, but there are laws permitting indebtedness incurred for the construction of certain municipal enterprises in excess of the statutory or charter limitations. There are about two hundred laws on the statute books relating to the issue of bonded and floating indebtedness by municipal corporations. All of those laws could be readily superseded by one general law authorizing municipalities to incur debt for any permanent improvement up to a certain maximum limit. This law should provide that the local governing bodies in cities could incur a funded debt for permanent improvements up to a certain maximum limit, but before incurring a debt between that maximum limit and the limit set for the municipality, the approval of the voters may be secured. In municipalities other than cities, the approval of the voters should be secured before any debt could be incurred.

The importance of a law of this kind in connection with the recent laws providing for more equitable assessment of general property subject to taxation and limiting the tax rate is obvious. Nearly every state in the union has a statutory or constitutional limitation of municipal indebtedness. The United States statutes limit the debt which may be incurred by a local government in the various territories to four per cent. of the taxable property. With certain modifications a few of the more important statutory limitations of municipal indebtedness are as follows: Colorado, three per cent. of the ratables; Florida, five per cent. of the ratables, but no debt can be incurred except upon a two-thirds vote of the people; Kansas, five per cent. of the ratables in counties and towns and six per cent. of the ratables in cities (other than first-class cities) and school districts; Massachusetts, two and one-half per cent. of the ratables in cities; three per cent. of the ratables in towns; New Hampshire, five per cent. of the ratables; Ohio, four per cent. of the ratables in cities and villages, but the limit may be increased to eight per cent. when two-thirds of those voting favor such an increase; Rhode Island, three per cent. of the ratables. Some states limit municipal indebtedness by constitutional provision. A few illustrations are as follows:

Indiana, two per cent. of the ratables; New York, ten per cent. of the real estate valuations; Illinois, five per cent. of the ratables; Iowa, five per cent. of the ratables; Maine, five per cent. of the ratables; Pennsylvania, seven per cent. of the ratables, but no municipal corporation may issue a debt in excess of two per cent. of the ratables without the assent of the voters.

Three—A law providing for the appointment of a state auditor of municipal accounts. The auditor should have power to call for papers, to make examination of the present method of auditing municipal accounts as well as the methods of every official who has authority to disburse public moneys. These powers should be vested in him, chiefly for the purpose of fixing on some uniform system of accounting which, with slight variations in detail, could be made to apply to every local government.

An officer or officers with somewhat similar powers has been provided for in the states of Florida, Iowa and Ohio.

The enactment of these three laws, together with the laws of 1906 affecting taxation, would place the local fiscal system of New Jersey in an enviable position.

# MISCELLANY

**Oil in Irrigation Canals—Comparison of Water Rates—Cement Imports—Alien Can Own Cement Land—Ash Removal.**

## A New Use for Oil in Irrigation Canals.

The irrigation department of the Experiment Station of the University of California is investigating canal linings to stop seepage losses. This work was begun last year and is to be continued this summer. What is wanted is to find the cheapest material and simplest process; something which can be used on laterals as well as large canals, something which will check if not stop the percolation of water, prevent the growth of vegetation in canals and obstruct burrowing animals. Cement is effective but costly. Clay for puddling is not to be had in many valleys where water is valuable. There are, however, an unusual number of raw materials in California which promise well, crude oil and asphaltum being the most abundant, and the special purpose of this year's investigation is to test the native materials.

The results of last year's tests will soon be published as a station bulletin. They showed cement concrete to be most effective, but it cost six times as much as a lining of crude oil, which cut down the loss more than half, stopped all vegetable growth, and ended the work of gophers.

The station is especially desirous of securing two things:

1. From every irrigator or canal manager who has a lined ditch or reservoir, a description of how the work was done, what it cost, and what the result has been.

2. Suggestions as to the experiments to be made, especially of materials or methods of applying linings.

The investigation is in charge of Elwood Mead at the Agricultural Experiment Station, Berkeley, Calif.

## Comparison of Water Rates in Atlanta and Chattanooga.

Municipal ownership of water works was discussed at the monthly meeting of the Manufacturers' Association at Chattanoogo, Tenn., April 16, with a view to ascertaining the actual rates by the patrons of the water company in Chattanooga. H. F. Caldwell had gathered statistics which included the water bills of about 33 patrons, and rates from the same class of plants for the same amount of water in Atlanta, Ga., were then secured.

A comparison of these statistics showed that for the month of March, exclusive of plants that had installed sprinklers, the rates in Chattanooga average about 38 per cent higher than rates in Atlanta. Including the sprinkler service, for which no charge is made in Atlanta, the rates are between 49 and 50 per cent higher in Chattanooga. A statement accompanied the same, and a corresponding table showthe report of Mr. Caldwell, showing the actual amounts of water used by the various plants from which replies had been received and the rate charged for ing what the same amount of water cost in Atlanta.

## Imports of Portland Cement.

The importation of cement in February, 1907, was 100,000,000 pounds or over 250,000 barrels more than in February, 1906, the total importation for the month being 323,000 barrels of 380 pounds. In the eight months ending with February the imports were nearly four times as much as during the same period a year ago, being 2,282,000 barrels. If importations continue at the same rate until July 1, the highest record of the past will be equalled if not exceeded.

Exports of domestic cement during February were 60,848 barrels, nearly 2½ times as much as in February last year, but for the eight months the exports, 432,527 barrels, were only 70 per cent of those for the same period last year. The re-exports of foreign cement do not differ greatly from last year, being a little less for the month, 560 barrels and a little more for the eight months period, 12,000 barrels. There are in custom house storage 52,000 barrels ready for the spring trade.

## Aliens Can Own Cement Lands in Washington.

The supreme court of Washington handed down a decision April 6, holding that the constitutional provision which permits aliens to own mineral lands in that state extends to lands containing

silica, silicated rock and clay used in the manufacture of cement. The suit was brought in the name of the state to cause an escheat of property in Whatcom county, brought May 4, 1906, by Ernest E. Evans, an alien, on claim that the ownership of mineral lands only covered lands containing the precious metals. The court holds, however, that the minerals include silica, clay and practically everything of a mineral character not vegetable.

### Ashes Removed by Trolley Cars.

The borough of Brooklyn, New York, is using the trolly cars for the removal—not the collection—of the ashes and other waste fit only for filling-in purposes. The waste lands are located around Coney Island. These meadows cover many square miles, which, in their present condition, are not only worthless but a menace to public health, as they form vast propagating beds for malaria and mosquitoes. For the Department of Street Cleaning to haul the city's waste to this dumping ground by the means of carts and horses is impracticable, for, measured by time, the length of the average haul by one horse power is about three hours one way.

When, therefore, the American Railway Traffic Company, which is an auxiliary company of the Brooklyn Rapid Transit, submitted a fair proposition to the city for the removal of its ashes to this dumping ground it was accepted with alacrity.

The borough was divided into twelve districts. At a central point in each district was erected a dumping station, equipped with a platform, a crane and other necessary appliances, by the city. The company built a switch from the street car tracks and keeps each station supplied with its dumping or refuse tanks. These tanks are made of steel and each tank will hold five cart loads of ashes. Each flat car, also supplied by the company, will carry four tanks, and is operated by two men employed by the company, a motorman and a conductor. When there are a sufficient number of tanks filled the company loads its car, by means of the crane, and in an hour's time draws the car to the dumping ground. In this manner two men and one car perform the services of twenty men, twenty horses and twenty carts, in one hour, as compared with three hours.

# MUNICIPAL AND TECHNICAL LITERATURE

**Pollution of Upper Hudson—Gas and Its By-Products—Municipal and State Resorts.**

### Report on Pollution of Upper Hudson River.

Included in the last monthly bulletin of the State Health Department of New York is a report on the pollution of the waters of the upper Hudson river. The data given are the result of an investigation by the division of sanitary engineering, begun last November in the section of the upper Hudson between the upper limits of the village of Glens Falls and Waterford at the mouth of the Mohawk river, including the portions within New York state of the watersheds of two of the principal tributaries of the Hudson between these points, the Hoosick river and the Batten Kill and excepting the watersheds of Fish Creek, discharging into the Hudson at Schuylerville and of Anthony Kill, which were not vital. It is pointed out that inasmuch as the villages of Saratoga Springs and Round Lake otherwise dispose of their sewage, and as Ballston is about to do so, the pollution reaching Fish Creek and Anthony Kill is relatively negligible.

The investigation showed that a large proportion of the drainage area of the river above Glens Falls is included in the Adirondack Park. The total drainage area tributary to the Hudson at Glens Falls is 2790 square miles and the population on this portion of the watershed is 50,600. From Glens Falls to Waterford a drainage of 1324 square miles is tribu-

tary to the Hudson. This includes such portions of the drainage area of the Batten Kill (187 square miles) and the Hoosick river, (482 square miles) as are within the state. On this portion of the watershed of the Hudson the population is 111,565.

The State Health Department thus figures the density of population in the watershed above Glens Falls at 18 persons a square mile, while the density of population below, and including Glens Falls, is computed at eighty-four persons a square mile. Only one village in the watershed above Glens Falls has constructed a public sewer system, while on the watershed in New York state below Glens Falls there are eight villages having public sewer systems, though sewage disposal plants are operated in connection with three of these. Further, the density of population in the watershed below Glens Falls is increased to ninety persons a square mile, if the population and drainage areas of the Batten Kill and Hoosick river, in Vermont and Massachusetts, are added.

At Waterford the area of the entire watershed tributary to the Hudson, including 234 square miles of the drainage area of the Hoosick not within the state and 273 square miles of the drainage area of the Batten Kill not within the state, is 4,621 square miles.

Summarizing the results of its investigation this far, the department says:

For example, at a point just above Waterford the drainage area of the Hudson is 4,621 square miles and the population in the drainage area is 216,865, giving a population per square mile of forty-seven. The population connected with sewers discharging into streams is 45,270, which, if 2 per cent of the residual population ( a conservative estimate) are considered to directly pollute the streams, gives a total population polluting the river and tributaries of 48,700, or 22.5 per cent of the total population on the watershed.

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## Production and Average Prices of Gas and Its By-Products.

The recently issued report of the U. S. Geological Survey on the mineral resources of the United States, for 1905, contains a summary of reports from 529 companies making gas from coal, including the output from 2,998 by-product coke ovens. There has been an almost stationary condition of this industry, probably because the increase in gas production has been largely in water gas. The 477 water gas companies reporting made practically 83 billion cubic feet of gas, while less than 44 billion cubic feet of coal gas were made.

Of the coal gas sold, after allowing about 8 per cent. for losses, 27 billion feet were for lighting and nearly 13 billion for fuel. Of the water gas, 59½ billion cubic feet were sold for illuminating and nearly 18 billion for fuel. Of the total of both kinds, 73 per cent. of 86,350,000,000 cubic feet were sold for lighting and 27 per cent., or 31,516,000,000 cubic feet for fuel purposes.

The amount of coal gas sold is about one-third the total amount sold, being 40½ billion cubic feet, as compared with 83 billion cubic feet of water gas.

The average price of coal gas in 1905 was 81.4 cents per 1,000 cubic feet and of oil and water gas was $1. The average price of coal gas has been declining for the past three years, being 92 cents in 1904, with coal at $1.10 per short ton, and 97 cents in 1903, with coal at $1.24. The average price of coal in 1905 was $1.06. The drop in coal accounts for part of the reduction in price of gas, but, probably, the increased use of gas for fuel purposes, at lower prices than for illuminating, accounts for some of the reduction. Thus the fuel gas sold in 1903 was about 8 billion cubic feet at an average price of 98 cents, in 1904 was 9 billion at 96 cents, and in 1905 was over 13½ billion at 72 cents, while the average prices of illuminating gas for the same years were 97 cents in 1903, 91 cents in 1904 and 86 cents in 1905.

The average prices of coal gas in the various states in 1905 varied from 32 cents per 1,000 cubic feet in Maryland and the District of Columbia to $2.36 in Oregon for illuminating purposes; from 10 cents in Pennsylvania to $1.94 in Oregon for fuel purposes; and from 22 cents in Alabama to $2.18 in Oregon, for all purposes combined. The average prices of water gas varied from 86 cents in Illinois to $1.88 in Florida for illuminating purposes; from 71 cents in Kentucky and Ohio to $1.58 in Florida and the Dakotas for fuel purposes; and from 83 cents in Ohio to $1.74 in Florida for all purposes.

The value of the coke produced in 1905 in both gas works and by-product coke ovens ranged from $2.84 per ton in Alabama to $9.58 in California, averaging $3.28 for the whole country, as compared with $3.12 for 1904. The average yield was 70 per cent. of the coal used. The value of the coal tar produced in 1905 in the same works varied from 1.87 cents per gallon in Kentucky to 10 cents in Oregon, averaging 2.72 cents for the country at large as compared with 3.04 cents in 1904. The average yield was 9.79 gallons per ton of coal. The value of the tar produced in the water gas and oil gas works varied from 1 cent in New Hampshire to 10 cents in Arkansas, Kansas and Maryland, averaging 2.66 cents

for the whole country. The ammoniacal liquor produced from the 6,298,783 short tons of coal carbonized was equivalent to 22,455,857 pounds of anhydrous ammonia and was worth $1,728,254 or 27 cents per ton of coal used.

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## Municipal and State Reports.

Report of the Passaic River Flood District Commission. W. L. Dill, Clerk, Paterson, N. J.

The Passaic River Flood District Commission is a body formed under a state law to investigate the floods in the Passaic river and make recommendations of methods of improving conditions. It is made up of five members from Passaic, Rutherford, Paterson, Montclair and Newark, cities in the affected district, with Charles S. Gowen as chief engineer. The volume at hand contains Mr. Gowen's report of the engineering features, and the commission's recommendations of work to be done and of modifications of the law to give full authority for the work. In short, the recommendation is for a storage dam on the Pompton river, the eastern branch of the Passaic river, which will hold back the flood waters of this branch until the flood in the other branch has passed by, when the flood gates can be opened and the reservoir emptied ready to receive the next flood. A reservoir 38 feet deep will accomplish this purpose, flooding about 8,000 acres of ground, but little if any longer than it is now occasionally flooded, and costing $685,180. The required lands, relocations of canal, highways, railroads, pipe line and cemeteries, with 25 per cent. added for contingencies, legal proceedings and engineering make the proposition cost $3,850,000.

It is suggested that a dam 17 feet higher will double the capacity of the reservoir, flooding 11,200 acres and costing $1,062,225. The total cost of this proposition, on the same basis as the first is $9,440,000. Half of this reservoir being sufficient for flood storage purposes, the other half can be used for storage of water for municipal use. At some time in the not distant future this storage will be needed.

One of the most important parts of the report is the development of the principles on which the assessments of benefits should be based, for the same arguments will apply in other cases, with due modification to suit local conditions. This part of the report is reproduced in full elsewhere. The board of assessors appointed for the purpose of making an estimate of benefits was fully conversant with local conditions and made a detailed study. They reported a total of $5,128,263.50, of which $365,500 was benefit to municipalities and $815,000 to counties.

The commission was fortunate in the comparatively simple solution of the problem which was possible. Doubtless this is due in large part to the competent work of the chief engineer and the members of the commission.

Twenty-Seventh Annual Report of the New York State Board of Health, for 1906. Eugene H. Porter, M. D., Commissioner, Albany, N. Y.

The New York Health Department was thoroughly reorganized in 1906 and is now conducted under divisions of administration; sanitary engineering; laboratory work with hygiene, antitoxin, and cancer laboratories and a sewage experiment station; vital statistics; communicable diseases; and publicity and education.

The experiment station is of interest to engineers. It is located at Saratoga, where the city equipped a sewage disposal plant and the state is using the small amount of money appropriated for the purpose in equipping a laboratory for experimental work in connection therewith.

The sanitary engineering division during the year prepared rules for the protection of water supplies or investigated reports of violations of rules in sixteen places. Plans for sewer systems and extensions to existing systems in forty-three places were examined. Sewerage and sewerage disposal plans for five state institutions were prepared. Twenty-five sanitary investigations of various kinds were made in addition to twelve public nuisances of importance.

The department seems to have done much with the money appropriated to it and to deserve the additional amount necessary to put into operation the excellent system which it has planned.

One of the important divisions of the department of publicity and education is the annual conference of sanitary officers, the report of which is published in a separate volume. Among the papers of interest to engineers which are included in it are one by L. M. Wachter on the principles of water purification, and one by J. A. Amyot, on the nature of sewage and its proper disposal.

Annual Report of the City Engineer of Cambridge, Mass., 1906. L. M. Hastings, City Engineer.

The city engineer's office of Cambridge has supervised the expenditure of $18,602 for sewer maintenance, $14,866 for general sewerage construction, $5,815 for improved sewerage construction and $50,744 for separate sewerage system construction; total cost, $90,027, at an expense for supervision of $2,603. The cost of the other work supervised by this of-

fice is not stated in the report. The total cost of the engineer's office was $11,466. The water works department called for $3,158 worth of engineering work, highways for $1,782, and ten other city departments had amounts of $72 for cemetery surveys to $1,031 for miscellaneous work for committees, etc., assigned to them as their share of the engineer's office expenses.

The report contains a summary of sewerage statistics in a form recommended by the sanitary section of the Boston Society of Civil Engineers. This report is given to show what the form is. It is as follows for the year ending December 1, 1906:

GENERAL.

Population by census of 1905.... 97,431
Total area of city or town..6,535 sq. mi.
Area served by sewerage system about 6.00 sq. mi.
Collection system, for sewage only .....18.065 mi.
Collection system, for sewage and surface water.....110.061 mi.
Collection system, for surface water only.....5.635 mi.
Method of disposal, discharge into ocean by the Metropolitan (State) sewer.

COLLECTION.

Mains (Everything but House and Catch Basin Connections).
Miles extended during year:
For sewage only 2.609.
For sewage and surface water 0.036.
For surface water only 0.390.
Method of flushing:
By use of hydrant hose.
Method of cleaning:
By scraping and flushing.

House Connection.

By whom made:
By property owners.
Sizes:
6 inch diameter.

Catch Basins.

| | |
|---|---|
| Number | .... |
| Number cleaned | .... |
| Average amount material removed per catch basin | .... |
| Cost of removing material per cubic yard | .... |
| Cost of removing material per catch basin per year | .... |

DISCHARGE OF SEWAGE.

| | |
|---|---|
| Estimated population using sewer system | 97,000 |
| Number of buildings connected estimated at | 15,000 |

FINANCIAL.

Construction.

Receipts.

| | |
|---|---|
| Bonds issued | ..... |
| Appropriation | $78,068.84 |
| Assessments not available for expenditure | 6,099.96 |
| House connections | ..... |
| Other sources | ..... |
| Total | $78,068.84 |

Expenditures.

| | |
|---|---|
| Collection works: (a) Mains | $71,426.04 |
| Balance | 6,642.80 |
| Total | $78,068.84 |

Maintenance and Operation.

Receipts.

| | |
|---|---|
| Appropriation | $20,000.00 |
| Total | $20,000.00 |

Expenditures.

| | |
|---|---|
| Administration | $2,387.06 |
| Repairs | 3,036.98 |
| Cleaning sewers | 1,996.22 |
| Cleaning catch basins | 6,060.54 |
| Flushing sewers | 391.44 |
| Unclassified expenses | 4,736.41 |
| Balance | 1,397.35 |
| Total | $20,000.00 |
| Interest on bonds | ..... |
| Sinking fund | ..... |

GENERAL.

Total cost of collecting mains.$1,995,001.27
Total cost of works to date. .....
Bonded debt at date..... 891,000.00
Value of sinking fund at date .....
Average rate of interest on bonds, 3½ per cent.
Proportion of cost of system assessed on abutters...Estimated at ¾
Yearly assessment for maintenance .....Nothing
Method of assessing abutters and rate of assessment.
Based on frontage and area of lot within 100 feet of street.

Thirty-first Annual Report of the Water Commissioners of the Town of Danvers, Mass. Henry Newhall, Supt.

During 1906 the original water loan of $150,000, issued in 1876, was paid, leaving $100,000 still due. The town is asking authority to borrow another $150,000, with right to pay off as the sinking fund accumulates. Increases in sizes of mains are becoming necessary, and the town is taking the necessary steps to acquire a width of five rods around the lake used as a water supply, to protect the water from contamination. The area of this strip is about 17 acres.

The sinking fund, after paying the bonds due, has a balance of $4,544.

By comparing the trial balance of the ledger by items with that of the year before, the expenditures for permanent investments, as classified in the ledger, can be determined. All expenditures are given in detail of vouchers, in the report, but the construction expenditures are not classified for the year, making it somewhat inconvenient to determine from the two consecutive annual reports what the classified expenditures have been. Maintenance cost and interest and other expenditures are classified. The town should adopt the standard form of making water works reports and add it to the report as a summary.

# ORGANIZATIONS AND INDIVIDUALS

**Technical Meetings—Illinois City and Town Officials—Personal Notes.**

## Technical Meetings.

The date of the twenty-seventh annual convention of the American Water Works Association, to be held at Toronto, Ont., has been changed from June 11 to 14 to June 17 to 22. J. M. Diven, Sec'y, 14 George St., Charleston, S. C.

The semi-annual meeting of the American Society of Mechanical Engineers will be held at Indianapolis, Ind., May 28 to 31. Calvin W. Rice, Sec'y, 33 W. 39th St., New York City.

The annual convention of the National Electric Light Association will be held at Washington, D. C., June 4 to 7. C. L. Elgin, Sec'y, 29 W. 39th St., New York City.

The annual meeting of the American Society for Testing Materials will be held at Atlantic City, N. J., June 20 to 22. Edgar Marburg, Sec'y, University of Pennsylvania, Philadelphia.

The annual convention of the American Society of Civil Engineers will be held in the City of Mexico, Mexico, between June 20 and July 20, the exact date to be announced later. Chas. Warren Hunt, Sec'y, 220 W. 57th St., New York, N. Y.

The annual convention of the American Institute of Electrical Engineers will be held at Niagara Falls, N. Y., June 25 to 28. Ralph W. Pope, Sec'y, 29 W. 39th St., New York, N. Y.

At a meeting of the Western Society of Engineers, held in Chicago, April 3, R. M. Hosea presented a paper on "A Colorado Mountain Reservoir," in which he described the Sugar-Loaf reservoir, located about five miles from Leadville, Col., and the property of the Colorado Fuel and Iron Co. The dam is of earth and clay. The presence of bowlders in the borrow pits made grading machines unsatisfactory, and a small steam shovel was used with dump cars. All filling around the outlet pipe and cross walls was done with the best clay available, put in by hand, tamped and puddled with water. The dam is 208 feet wide at the base and 25 feet on top, with three 48-inch pipes laid in a concrete bed or cradle, with concrete cross walls carried around and above the pipe at intervals. The pipes discharge into a concrete basin; their upstream ends are in a concrete inlet chamber, each pipe having a double-seated valve working vertically. An ample spillway is provided, capable of safely carrying off all flood discharge. The shrinkage of the material in the dam was 5.44 per cent.

The annual banquet of the Washington Association of the members of the American Society of Civil Engineers was held at Rauscher's, March 23. After the banquet F. H. Newell spoke on "Reclamation Service;" Mr. A. M. Phillips, on "The Sewerage System of Washington;" Capt. J. S. Sewell, on "Reinforced Concrete Construction and Conflagration Prevention;" Mr. W. H. Wiley, on "The Relations of Congress to District Engineering;" Mr. John F. Hayford, on "The Relation of Science to Engineering;" Mr. M. O. Leighton, on "Opportunities of Engineering," and Mr. W. J. McGee, on "The Inland Waterways Commission and Needed Improvements in Transportation Facilities of the Country." Gen. W. Crozier gave an informal address on "Modern Ordnance," and Mr. H. M. Wilson one on "National Drainage of Swamps and Overflowed Lands." A committee of five members was elected for the government of the organization for the ensuing year, as follows: Chairman, Mr. F. H. Newell; Gen. W. Crozier, Mr. F. L. Averill, Mr. C. B. Hunt and Mr. G. R. Putnam.

The Southern convention of cement users will be held in Atlanta, Ga., in October, after the 10th, during the Georgia State Fair.

The cement users of the Southwest held a meeting, April 24, at the office of P. H. Forbes, 625 Kansas Ave., Topeka, Kans., to organize a cement users' association.

The thirtieth convention of the National Electric Light Association will be held at Washington, D. C., June 4 to 7, 1907.

The Exposition of Safety Devices and Industrial Hygiene held last winter by the American Institute of Social Service, in New York, is to be made a permanent Museum of Security. The *Scientific American* will give annually a gold medal, to be awarded by the American Institute of

Social Service for the best device for preventing accidents.

## Civil Service Examinations.

The U. S. Civil Service Commission will hold examinations at the usual places as follows:

For assistant inspector of construction in Quartermaster's Department at Large at Ft. MacKenzie, Wyo., at $900 a year, on May 29.

For at least thirteen aids in Coast and Geodetic Survey, at $720 to $900 a year, on May 15 and 16, appointments to be made by July 1.

For laboratory assistant who is qualified as glass blower, in Bureau of Chemistry, Department of Agriculture, at $1,000 a year, on May 29.

For statistical assistant, with special knowledge of statistics of fuel production, in Geological Survey, at $1,200 a year, on May 22.

For chief engineer in the Chicago postoffice building, at $1,800, increasing to $2,500, on May 8.

For electrical engineer in Quartermaster's Department at Large, Jefferson Barracks, Mo., at $1,500 a year, and for engineman at Ft. H. G. Wright, New York, at $900 a year, on May 1.

For assistant chemist, laboratory assistants in chemistry and physics and assistant physicist, in the Bureau of Standards, at $900 to $1,600 a year, on May 8.

## Illinois City and Village Officials.

The elections held in Illinois, April 16, resulted in the election of officers as follows:

Arrowsmith—Village president, C. R. Nace; clerk, H. M. Scott; trustees, H. J. Thompson, M. S. Wise, Jacob Wyckoff.

Auburn—Mayor, J. A. Wheeler.

Bellflower—Village president, Newton Jenkins; trustees, T. S. Innis, W. Yarrington, Nils Burk.

Bloomington—Mayor, Edward Holland; city clerk, Harry Rhoads; city attorney, Louis Fitzhenry; city treasurer, Raymond Dooley; city engineer, Charles F. Fauntz; superintendent of streets, John F. Anderson.

Broadwell—Village clerk, S. J. Rickords; treasurer, Lincoln Eisminger; trustees, N. Eisminger, Louis Lockhart, Christian Streggow.

Chatsworth—Village president, — Walter.

Chenoa—Mayor, John E. Wightman; city clerk, A. O. Rupp; city treasurer, Victor L. Nickel; city attorney, James P. Grove.

Chicago—Mayor, Frederick A. Busse.

Clinton—Mayor, Dr. Edmonston; treasurer, Charles Griffin; aldermen, H. C. Griffith, J. E. Morse, Harry McDonald, Perry Hughes; city attorney, Morris Hinchcliff.

Cooksville—Village president, J. E. Gladson; clerk, C. E. Zeal; trustees, W. H. Mahon, Thomas Arnold, E. I. Custer.

Colfax—Village president, W. E. Goudy; clerk, J. L. Banes; trustees, C. M. Gilmore, Robert Henline, Henry Helms.

Cullom—Mayor, — Flessner; trustees, M. Cook, C. J. Kingdon, F. M. Kopp.

Danvers—Village president, John Kohr; trustees, Orland P. Skaggs, Louis Streble, Andrew Drohan.

Danville—Mayor, John H. Lewman; city clerk, John Torrance; city attorney, Joseph Barhart; treasurer, C. F. Swift.

Decatur—Mayor, E. S. McDonald; city clerk, Albert Leach; attorney, W. N. Bogges; treasurer, J. W. Carter; street superintendent, James Lemmings; aldermen, Fred Williams, Byrd Davis, Louis Baker, Ed Frahbuan, Charles Schneider, Fred Keck, L. W. Freibourg.

Deland—Village president, J. E. Bickel; trustees, S. C. Rodman, L. B. Hurst, R. W. Hantz.

Delavan—Mayor, — Kelcher; clerk, — Sunderland; treasurer, — Warner.

El Paso—Mayor, Peter Downer; clerk, — Tegtmyer; treasurer, — Parmelee; city attorney, — Baker.

Emden—Village president, John Zimmer, Jr.; clerk, John Uhlman; trustees, Nenner Rademacher, T. L. Bowles, Reka A. Albers.

Eureka—Mayor, R. J. Dickinson; city clerk, H. I. Reynolds; treasurer, W. Simpson; attorney, E. J. Riley; aldermen, J. A. McGuire, T. J. McGuire, E. C. Engle.

Fairbury—Mayor, E. S. Wilson; clerk, G. W. Bennett; attorney, J. H. McFadden; treasurer, T. S. O. McDowell; aldermen, A. B. Claudon, Marshall Gordon, Wm. Conn.

Farmer City—Mayor, C. D. Rock; clerk, Thomas Young; treasurer, Sherman Tull; attorney, B. F. Brown; aldermen, E. D. Childress, H. Williams, John Covey.

Fisher—Mayor, J. M. Billew; trustees, W. Gardner, J. A. Cooper, R. T. Miles; clerk, J. G. Lamb.

Freeport—Mayor, C. J. Dittmor.

Heyworth—Mayor, J. P. Shelton; village clerk, M. J. Plumley; trustees, T. W. Iseminger, John T. Buck, Gardner Powell.

Hopdale—Village president, H. F. Froebe; trustees, E. M. Garlick, Joseph Eichelberger, F. A. Davis.

Hudson—Village president, Albert Abrams; trustees, Abraham Ringhouse, W. S. Vandagraft; village clerk, Floyd May.

Jacksonville—Mayor, — Davis.

Joliet—Mayor, John B. Cronin.

Kappa—Village president, L. O. Wheaton; trustees, J. C. McGraw, Eugene Porter, H. H. McClure.

Kenney—Clerk, E. Plumington; trustees, J. W. Turner, E. L. Foster, H. J. Weller, J. S. Miller.

Leroy—Mayor, T. W. Vannatta; city clerk, John B. Chick; city treasurer, E. F. Hall; city attorney, E. D. Riddle.

Lexington—Mayor, R. L. Heydacker; city clerk, Roy J. Maddock; city treasurer, George Morris.

Lincoln—Mayor, Edwin B. Maltby; city clerk, C. E. Barrow; city attorney, Uri Kissinger; treasurer, John Q. Smith; aldermen, John Healy, A. E. Brown, Chas. Anton, Joseph Maleuch, Robert Schuster.

McLean—Village president, John Wagner; village clerk, T. McFarland; trustees, John W. Baker, L. F. Gifford, C. W. Welch.

Mackinaw—Village president, H. J. Puterbaugh; trustees, J. S. Wilson, J. A. Long, Jr., Thomas Vremont.

Mahomet—Village president, J. W. Herriott; trustees, W. M. Buckels, C. W. Carson, Frank Miner.

Mansfield—Village president, H. R. Gladden; trustees, E. F. Fisher, A. C. Smolkers.

Maroa—City clerk, R. D. Bolin; treasurer, John Longstreet; aldermen, Ben Parker, Ed Hendryx, Charles Smith.

Mason City—Mayor, C. W. Cargill; city clerk, Renby Coon; treasurer, J. H. Thompson; aldermen, C. E. Chambers, G. L. Bolinger, H. M. Hale.

Melvin—Village president, Albert Bachholtz; trustees, Wm. McLaughlin, Chas. Sharp, George Tarends, Ben Hull, John Worthington.

Metamora—Mayor, Frank Giehl, Sr.; aldermen, John C. Snyder, John C. Schrepfor, Joseph Meek, Henry Heininger.

Minier—Village president, L. S. Tanner; clerk, Fred Lower; trustees, J. F. Davis, John Krueger, David Bradley.

Morton—Village president, Samuel Mosiman; trustees, Carl Wurst, Samuel Strubhar, Bert Trachful.

New Holland—Clerk, L. Lheary; trustees, Harry Cooper, J. S. Wunderle, H. G. Barkmeier, Oscar Warzel.

Paxton—Mayor, C. E. Beach; treasurer, A. J. Egnell; attorney, A. J. Duffield; clerk, E. M. Grayson; aldermen, Joseph Newton, W. P. Westbrook, W. H. White, G. J. Johnson.

Peoria—Mayor, Thomas O'Conner.

Pontiac—Mayor, J. M. Lyon; city clerk, C. J. Lemessurier; city attorney, B. W. Adsit; treasurer, Clark L. Legg; aldermen, W. H. Bentley, J. D. Kane, M. L. Young, T. L. Graves.

Rockford—Mayor, Mark Jardine.

San Jose—Mayor, Henry Woll; aldermen, George Woll, S. B. Hullinger.

Saybrook—Village president, W. T. McDaniel; trustees, J. E. Wyckoff, Frank Wooley, H. D. Stone.

Sibley—Village president, Swen Anderson; trustees, D. F. Cavanaugh, S. J. Herdicka, Fred Lohimer.

Springfield—Mayor, David S. Griffiths; city clerk, Emil Smith.

Talluia—Village president, Geo. Husmann; trustees, Wm. Wolfe, W. C. Trenary, Thomas Hutton; clerk, Robert Savre.

Towanda—Village president, B. G. Falkingham; trustees, R. C. Vanneman, W. P. Kerr, H. E. Tilbury.

Tremont—Village president, Wm. Noonen; trustees, George Hacelman, H. J. Schmidt, B. C. Shane.

Wapella—Village president, W. A. Graham.

Washington—Mayor, E. L. Meyers; clerk, John Watson; treasurer, D. A. Stormer; attorney, C. A. Waltmire; aldermen, Peter Garber, John W. Wilson, M. C. Hughes.

Waynesville—Village president, Roy Crutcher; trustees, Jacob Baker, Wm. Lohrs, J. O. Davis.

Weldon—Village president, C. A. Gale; trustees, J. L. Costley, B. W. Tilbury, E. T. Gray.

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## Town Officers in Illinois.

Elections held in towns and townships in Illinois, April 2, resulted in the election of officers as follows:

Atlanta, Logan Co., Atlanta Twp.—Supervisor, J. E. Arnold; clerk, Claude Miller; commissioner of highways, John Cheek.

Beason, Logan Co.—Supervisor, J. W. Keys; clerk, Amor Parks; commissioner of highways, Mayo Haas.

Benson, Woodford Co., Clayton Twp.—Supervisor, E. E. Learned; town clerk, J. W. Heiken.

Clinton, DeWitt Co.—Supervisor, C. S. Hoffman; assistant supervisor, H. C. Griffin; clerk, W. W. Graham; commissioner of highways, J. B. Bryant.

Cullom, Livingston Co., Sullivan Twp.—Supervisor, — Sollinger; town clerk, P. J. Cook.

Decatur, Macon Co.—Supervisor, J. G. Bixby; assistants, Frank Halmacher, G. W. Allen, J. D. Koons, Charles Becker; commissioner of highways, Fred Spitler; clerk, I. N. Coltren.

Delavan, Tazewell Co.—Supervisor, J. A. Jones; town clerk, E. R. Rhodes; commissioner of highways, David Drake.

El Paso, Woodford Co., El Paso Twp.—Supervisor, — Childs; clerk, — Hayward; commissioner of highways, — Valentine.

Emden, Logan Co., Prairie Creek Twp.—Clerk, Charles Tuler; supervisor, James Gabbett; commissioner of highways, W. Johnson.

Fairbury, Livingston Co., Indian Grove Twp.—Supervisor, — Brownson; commissioner of highways, — Carter.

Farmer City, DeWitt Co.—Supervisor, Charles Arbogast; clerk, Henry Funk; commissioner of highways of District No. 3, George Reeser.

Gibson City, Ford Co., Drummer Twp.—Town clerk, W. E. McMullin; commissioner of highways, W. S. Husted.

Havana, Mason Co., Havana Twp.—Assistant supervisor, Frank Mowder; clerk, L. N. Menke; commissioner of highways, Gerhard Trimpe. Easton Twp.—Supervisor, John Cunningham; clerk, J. S. Ryno; commissioner of highways, Joseph Umbach. Crane Creek Twp.—Chairman board of supervisors, D. Van Etten; clerk, John Norriss; commissioner of highways, Alza Maun.

Hopedale, Tazewell Co.—Supervisor, — Schneider; commissioner of highways, — Lankkuf.

Kappa, Woodford Co.—Supervisor, — Childs; clerk, — Hayward; commissioner of highways, — Valentine.

Kenney, DeWitt Co.—Supervisor, O. W. Howard; town clerk, C. A. Florey; commissioner of highways, L. O. Foster.

Lincoln, Logan Co., Broadwell Twp.—Clerk, Thomas Hanahan; commissioner of highways, Thomas Gleason. Sheridan Twp.—Supervisor, Urlah Wendell; clerk, G. M. Wendell; commissioner of highways, John Rubenking. Eminence Twp.—Supervisor, H. E. Kinsenberg. Oran Twp.—Supervisor, J. H. Hammetton; clerk, Thomas Hamilton.

Mahomet, Champaign Co.—Clerk, C. L. Lindsey; commissioner of highways, William Quail.

Maroa, Macon Co.—Supervisor, R. B. Wikoff; clerk, Peter Swan; commissioner of highways, John O. Ward.

Mason City, Mason Co., Salt Creek Twp.—Town clerk, John Marten; commissioner of highways, T. J. Street. Pennsylvania Twp.—Supervisor, C. W. Fugh; clerk, C. Tomlin; commissioner of highways, Harman Bleseman. Mason City Twp.—Town clerk, J. A. Tyrell; commissioner of highways, Jacob Velde.

Metamora, Woodford Co., Metamora Twp.—Supervisor, Henry Heininger; town clerk, James Hall; road commissioner, John Schrierer.

Middletown, Logan Co., Corwin Twp.—Supervisor, — Boyer; town clerk, — Turner; commissioner of highways, — Gupton.

Minier, Tazewell Co., Little Mackinaw Twp.—Clerk, Fred Lower; commissioner of highways, — Roberson.

Paxton, Ford Co.—Supervisor, Albert Froyd; assistant supervisor, W. M. Denman; town clerk, Victor E. Johnson; commissioner of highways, T. O. Thompson.

Roanoke, Woodford Co.—Town clerk, W. F. Brown; commissioner of highways, William Geiger.

Roberts, Ford Co.—Clerk, W. O. Sanders; supervisor, R. B. Chambers; road commissioner, A. Brunton.

San Jose, Mason Co., Allen's Grove Twp.—Supervisor, James Houchins; town clerk, George Barkmeier; road commissioner, Charles Imig.

Sibley, Ford Co., Sullivan Twp.—Supervisor, — Stockdale; clerk, — Ardlicka.

Washington, Tazewell Co., Washington Twp.—Town clerk, John Watson; commissioner of highways, Samuel B. Wagner.

Weldon, DeWitt Co.—Supervisor, J. W. Coffman; clerk, P. L. Reuther; commissioner of highways, D. C. Mawhinney.

## Personal Notes.

F. B. Hancock has been elected city engineer at Quincy, Ill.

Hon. John Bunyan has been elected mayor of Berthoud, Col.

W. B. Getchell has been re-elected city engineer at Augusta, Me.

Fred Giddings has been reappointed city engineer at Atchison, Kans.

W. W. Berry has been re-elected chief engineer at Waterville, Me.

Myron Shepard has been re-elected city engineer at Stillwater, Minn.

Alonzo K. Crowell has been elected city engineer at Taunton, Mass.

A. P. Smith has been reappointed city engineer at North Tonawanda, N. Y.

Paul B. Davis has been appointed assistant city engineer at Reading, Pa.

W. A. McCalley, of Tuscaloosa, Ala., has been elected city engineer of Decatur, Ala.

Hon. John I. Howe, mayor of Roselle, N. J., has resigned on account of ill health.

Frans Engstrom, of Wilkinsburg, Pa., has been appointed city engineer of Altoona, Pa.

M. B. Haynes has been appointed city engineer at Mankato, Minn., succeeding J. B. Thompson.

Mayor John A. Reyburn, of Philadelphia, has appointed George R. Stearns director of public works.

Hon. Cornelius Eckhardt has resigned as mayor of Kensington, Md., his resignation to take effect May 1.

Le Roy Churchill Chowning has been appointed chief mechanical engineer of water works at Corning, N. Y.

Robert S. Sinclair, of South Orange, N. J., was appointed a member of the Essex County Park Commission, April 12.

F. G. Bryson, of the city engineer department of Ottawa, Ont., has been appointed town engineer of Pembroke, Ont.

Sebastian Zohn has been elected president of the Board of Water Works at Louisville, Ky., to succeed Charles R. Long.

Henry Dixon, assistant city engineer at Fort Worth, Tex., has been appointed city engineer to succeed J. B. Hawley, resigned.

Wayne Maxwell was appointed on April 7 inspector of asphalt paving and raw asphalt to be used in paving at Des Moines, Ia.

Hon. George L. Simpson, former mayor of Alexandria, Va., was stricken with apoplexy, April 20, and died a few minutes afterwards.

R. A. Warner, township engineer in charge of sewers at Bryn Mawr, Pa., has been appointed superintendent of the sewer department.

Robert W. Hunt & Co., of Chicago, will remove their New York offices, May 1, from 66 Broadway to the new West Street Building, 90 West st.

Russell R. Stuart has been appointed as expert on river canalization and water supply in the office of the New York State Engineer and Surveyor.

George Jerome, formerly assistant city engineer at Detroit, Mich., has opened an office in that city and will make a specialty of municipal work.

William G. Clark has been appointed consulting engineer to the Board of Public Service of Toledo, O., to supervise the construction of the new filter plant.

R. W. Hobart, who has been a member of the Isthmian Canal Commission about two years, has been appointed resident engineer, with offices at San Pablo, Canal Zone.

Mayor McCall, of Chippewa Falls, Wis., has made appointments as follows: City clerk, John Wiley; city engineer, David Kirk; street commissioner, L. J. Vincent.

B. H. Rader has been appointed Eastern sales agent for the Universal Portland Cement Co., of Chicago and Pittsburg, with office in the Frick Building, Pittsburg.

J. A. Billodeau has been appointed superintendent of the water and sewer department at Pittsfield, Mass., to succeed Thomas Martin, who resigned on account of ill health.

Hon. Fred A. Busse was installed as mayor of Chicago, April 15, to succeed Mayor Dunne. Mr. Busse is the first to serve as mayor under the four-year term in Chicago.

J. E. W. Goslou has been engaged by the Board of Works, at Newark, N. J., to take charge of a laboratory which is to be established by the city for testing paving materials.

James Nisbet Hazelhurst, former chief engineer, Board of Public Works, Mobile, Ala., has established offices at 905 Candler Building, Atlanta, Ga., and will practice as consulting engineer.

William E. Goodwin, who has been acting as supervising engineer in the construction of a new water works system at Trinidad, Col., will establish an office in Kansas City, Mo., about June 1.

William S. Johnson, who has for twelve years been assistant engineer of the Massachusetts State Board of Health, has established an office at 101 Tremont st., Boston, for civil engineering practice, making a specialty of sanitary and hydraulic work.

Donald M. Belcher, formerly assistant engineer in water purification work at Columbus, O., is now resident engineer on the construction of the sewage purification plant at Washington, Pa. R. Winthrop Pratt, of Columbus, is designing and supervising engineer.

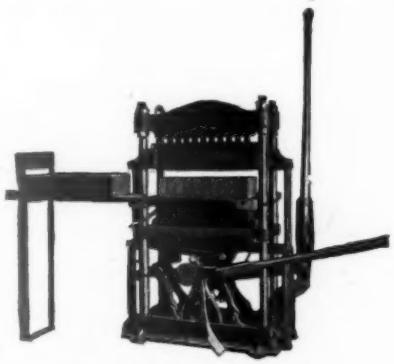
Mr. W. K. Eldridge, formerly of the Brubaker-Eldridge Company, has opened an office at 827 Board of Trade Building, Indianapolis, Ind., for the practice of commercial and industrial architecture, hydraulic and sanitary engineering. Mr. Eldridge has had fifteen years' experience in railway and municipal engineering, and as architect and structural engineer.

# MACHINERY AND TRADE

## The Helm Cement Brick Press.

The accompanying cut shows the Helm press for making cement brick, which is now reported to have been successfully operated for more than three years and in thirty-seven States. It makes ten brick at once, and its capacity is 10,000 brick a day. If the machine is used for making veneer or two-piece concrete blocks, 2,000 can be made a day. In each case it takes three men to operate the machine and supply it with material.

This company also makes machines for making triple air-space two-piece concrete



THE HELM BRICK PRESS.

blocks, hand and power concrete mixers on continuous and on batch principle, and a truck for transferring bricks and blocks from machine to storage, for which no track is required. The territory is divided between the Helm Brick Machine Co. and the Queen City Brick Machine Co., both in Traverse City, Mich., the former controlling west of the Mississippi river and the latter east of it. Inquiries for further information should be addressed to the company holding the territory from which they come.

## A Pressure Block Machine.

Somers Brothers, of Urbana, Ill., have developed a machine for making hollow concrete blocks under pressure, for which they show remarkable results in speed of manufacture, at the same time that they claim quality equal to that of blocks made by the tamping process. Two block molds can be used with each press. The molds are mounted on frames equipped with flanged wheels running on a track, so that while one block is under pressure another block is taken off the machine and the mold is filled ready for another block. A downward motion of the press lever is said to apply 60,000 pounds pressure to the block. As the mold is pulled out from under the press, the machine lever is pressed down, raising the hopper, extracting the core, opening the mold and raising the block with the one motion.

A capacity of 600 blocks a day is claimed for the machine with three men. Reports from users say 500 blocks with two men at the machine and others to mix the material; also 388 perfect blocks in five hours, with three men mixing their own material, a rate of 776 blocks a day if kept up for ten hours.

The machine is fitted with all kinds of designs for faces, hollows, etc., and for any sizes from 4 to 6 inches high, 3 to 10 inches wide and 3 to 20 inches long, the standard size being 6 by 8 by 20 inches. These sizes make it possible to meet all demands of architects' plans. Angle blocks, footings, piers, chimney blocks, etc., are also provided for.

A booklet giving comparisons of cost of making and laying blocks with the Somers machine and other machines, and with brick, will be sent by Somers Bros., Urbana, Ill., on request.

## Waterproof Concrete.

Practical tests of the value of hydrated lime in Portland cement mortar as a waterproofing material have been made under the direction of Charles Warner Co., Wilmington, Del., by the Henry S. Spackman Engineering Co., Philadelphia, Pa., and the results have been published in a pamphlet issued by the Charles Warner Co., which can be had on application. A few of the general results may be stated.

In mortar, 1 cement to 3 sand, there is a reduction in strength at nine months for any percentage of lime added, but the results of tests at three months' age of briquettes show no loss until more than 15 per cent. of the Portland cement is replaced by lime. This is probably because the cement is in sufficient quantity

to fill the voids in the sand used and the lime simply acts as a dilutent.

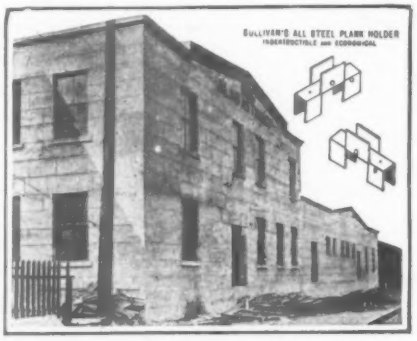
In mortar, 1 cement to 5 sand, the voids are not all filled with cement, and when part of the cement is replaced by lime there is an increase in strength, which becomes a maximum with 20 to 25 per cent. of lime, and reduces to the strength of the Portland cement mortar without lime only when 40 per cent. or more of lime has displaced cement in the mixture.

The tests of permeability of mortar pats by water show at seven days' age of briquettes no water passing through under pressure of 10 to 30 pounds in one minute, but at 30 pounds 10 c.c. of water passed through 3.14 square inches of a pat 1 inch thick in one hour, and the amount passing through in an hour was reduced by replacing cement by limoid, until 15 per cent. of limoid reduced the passage of water to 0.5 c.c. in one hour. At 28 days' age of briquettes no water passed through under any pressure from 10 to 30 pounds for any mixture. With 1 to 5 mixtures 3,000 c.c. passed through a cement mortar pat in one hour, under 30 pounds pressure. This was reduced to 5 c.c. by using 5 per cent. of limoid, to 2.5 c.c. by using 10 per cent., and to zero by using 15 per cent. At six weeks' age of briquettes the 1090 c.c. with cement mortar was reduced to 3 c.c. with 5 per cent. of limoid and zero with 10 per cent.

The remarkable increase of strength with decrease in permeability gives two very good reasons for using limoid in the leaner cement mortars, which can often be substituted for richer mortars so far as strength is concerned, since impermeability can be secured by the use of limoid.

## How to Save Money on Forms for Concrete Walls.

The accompanying cut is a representation of two buildings that were erected by J. H. Sullivan last summer for the Alabastine Company of Grand Rapids, Michigan. The two story building is 54 feet by 100 feet on the ground, and 36 feet high. The warehouse building at the right of picture, is 100 by 104 feet, and 16 feet high. These buildings are as nearly fire proof as they can be constructed. There is not a stick of wood or anything of an inflammable nature in them. The walls above ground are twelve inches thick, made of concrete. The columns and beams are concrete reinforced with steel. The floors are concrete and hollow tile finished with a coat of cement on top to a true surface. The walls and piers, columns and girders were built with forms only two planks high on each face of wall. These buildings would take thousands of feet of lumber by the old method of constructing concrete walls. By the method used, with Sullivan's plank holders, his own invention, it was possible to save on the construction of these two buildings, several thousands of dollars in lumber and carpenter work alone. In the right hand upper corner of the picture, are small cuts showing these plank holders. They have made like sav-




ing for several other builders throughout the country. Further information can be obtained from the inventor and manufacturer, J. H. Sullivan, 2 Norris Block, or from the Alabastine Co., Grand Rapids, buildings.

The plank holders are made of soft steel and they are practically indestructible. They stand the severest tests usually accorded to tools in the erection of Michigan.

## Specifications for Use of Tarvia on Roads.

A little over a year ago a coal tar preparation called Tarvia was introduced and broad claims were made regarding its dust laying possibilities. During the past year a little over 800,000 square yards of roads have been treated with this preparation, and the results have been most satisfactory. The roads were located in thirty different cities in different parts of the country and some of it was done in Jackson, Tenn., under the government supervision. Judging from the experience of the past year this method of treatment promises to be one of the most prominent improvements in highway construction since the days of Telford and MacAdam.

Tarvia is a coal tar preparation which can be applied to the surface of a macadam road in such a way as to unite the top dressing into a waterproof bonded surface which will not disintegrate into dust. The method of treatment is as follows:

First, the road to be treated should

be a well built, firmly bonded macadam in fairly smooth condition.

If the road to be treated is a new one, it should be built in the usual manner, and, after the road is puddled, sufficent screening spread over the surface to protect it against ravelling by the traffic; allow the traffic to use for two to six weeks or until the road is thoroughly dried out, when the screenings which are not bonded should be removed, leaving exposed the inch or inch and a half stone which forms the wearing surface.

If it is an old road which is being treated, all screenings, dirt, etc., which are over the inch or inch and a half stone, whichever is used for the wearing surface, shall be removed, either by sweeping or scraping if the screenings shall be caked. Many roads are maintained by keeping from ½ inch to 1½ inches of screenings which have passed a quarter or half inch mesh caked on the surface by continually wetting and rolling, and it is absolutely necessary that these should be removed in order to make a satisfactory job. If they are not removed, the result is that as soon as these screenings are dry the adhesion is destroyed, and the screenings become entirely lose, thus breaking the entire tarviated surface; consequently they must be removed, even if necessary to scrape.

After the macadam is thoroughly cleaned and perfectly dry, it is coated evenly with Tarvia, heated to a temperature of from 160 to 180 degrees Fahrenheit, using from 1-3 to ½ a gallon per square yard.

Various methods for heating Tarvia have been used; namely, tank wagons holding from 500 to 600 gallons, with fire boxes; roofing kettles mounted on wheels; and in many places the work has been convenient to the factories, so that the Tarvia is delivered hot direct from the factory and no heating is required.

Sprinklers for distributing from the tank wagons, made with pipes with slots and small holes, have been used in the hopes of doing away with the sweeping, but so far nothing of the kind has given distribution even enough to do away with the sweeping. The most satisfactory method has been to use a hose attached to either the tank wagon or the roofing kettle, allowing the Tarvia to flow from the open end onto the road, and sweeping with street sweepers' fibre brooms.

MONTGOMERY PIKE, ROSEMOUNT, PA., MADE DUSTLESS WITH TARVIA.

After the Tarvia has been allowed to penetrate the road for from two to twelve hours, it is covered with an even layer of crushed stone screenings which have passed a quarter or three-eighths inch mesh, with not more than 50 per cent fine material. The entire surface is then rolled, with steam roller if possible, and if there are any black spots showing through the screenings behind the roller, additional screenings should be applied, and again rolled until the black spots do not show after the rolling. After a period of from

two to six weeks, depending somewhat on conditions, the loose dust and screenings which have not been bonded with the Tarvia can be removed, leaving the surface perfectly smooth and clean.

The first application of Tarvia generally makes the road dustless for about a year. Applications thereafter are necessary every two years, less and less Tarvia being used.

## Machinery for Measuring and Mixing Concrete.

Mr. A. F. Nims is a prominent public works contractor, living in Rochester, N. Y., who is a graduate civil engineer and has had twenty-seven years' experience. He has developed for use on his own work a system of automatic measurement of the materials required for concrete and of mixing the same, which has given him some remarkable results as to speed, economy, low power and low first cost. He has decided to put the machinery on the market for the benefit of other contractors, and has issued a preliminary catalogue under date of April, 1907, which gives some idea of the advantages of the machines.

There are really two machines, the measuring machine and the mixer, and they can be used separately, the measuring machine being adapted to any mixer and the mixer to any method of measuring materials. Mr. Nims claims the best results from the combination of his two machines within the limits of their capacity. The machines can be mounted on skids or trucks, can be run by hand or by power, and can operate on the traction principle, if desired, moving themselves forward as the work progresses. The materials travel through the measurer by gravity, so that no power is required to operate it. In fact, Mr. Nims says that it develops some power, so that it requires controlling and regulating gear. The mixer requires a 5-h.p. gasoline or other engine, and a 7-h.p. engine is recommended if the machines move themselves from place to place.

The measuring machine has a capacity, when fully manned, of 900 cubic yards per day of ten hours, so that it will, without any question, keep the mixer supplied up to its capacity of 600 cubic yards a day. The number of men required depends upon the method of feeding materials. On street work, where the materials are dumped on the street in windrows, 12 to 14 men can be kept shoveling into it, and in practice 200 to 280 yards of concrete can be deposited. One example given is of eight men and four one-horse carts depositing 150 cubic yards in 10 hours, with 400 feet haul, at a total expense of 14 cents a cubic yard.

PAINTING THE PASEO, KANSAS CITY, MO., WITH TARVIA TO PREVENT DUST.

Strong claim is made that the measuring machine cannot clog and that it measures and delivers the cement, sand and stone exactly according to the proportions for which it is set, so that each batch or the continuous delivery to the mixer is correct and uniform in proportions. Any departure from specification can be detected by the inspector because the whole operation is in plain view.

The mixer is a double cube, joined in one piece along the axis of the cube

mixer, having no vanes, bolts or rods inside, but being perfectly smooth. It is designed as a continuous mixer, but can be used as a batch mixer by putting on an automatic gate at the discharge end. It is easy to keep clean and is definitely stated not to clog.

The machine is strong and durable, easily moved on its trucks and adjusted to the place in which it must work. Mr. A. F. Nims will give full information about sizes, prices and combinations on application to him at 263 South ave., Rochester, N. Y.

## A New Firm Making Asphalt Paving Plants.

The Atlas Dryer Co., Schofield Building, Cleveland, O., has been formed to manufacture a dryer, the invention of Mr. W. M. Cummer, and will put on the market a full line of the dryers and will also manufacture asphalt paving plants. Portland cement plants using the dry process or pulverized coal for fuel will also be interested in the new dryer.

Mr. Cummer was for many years the president, treasurer and general manager of the T. D. Cummer and Son Company, so that he is fully equipped with the experience necessary to gain a full measure of success in the field the new company is entering. He has retired from all the offices in the old company and is now the president of the Atlas Dryer Company. Full information will be sent on application.

## Cost of Trenching with the Buckeye Traction Ditcher.

The Buckeye traction ditcher is a machine for digging trenches for conduits, water and sewer pipes, drain tile and the like, which has proved itself economical and therefore valuable.

The machine consists essentially of a large wheel, to the periphery of which are fastened the digging buckets. The wheel has no axle, but is supported by four pairs of rollers inside its periphery. The wheel is supported between I beams projecting from the rear of the trucks. These I beams can be quickly raised or lowered by the operator, so that the bottom of the wheel can cut to the exact depth and grade desired. By sighting along range poles stuck in the ground ahead of the machine, the operator can keep not only on line with his trench, but the bottom of the trench exactly to grade. The machine is self-propelling, and moves steadily forward, leaving the completed trench behind. In digging a trench 26 inches wide by 7 feet deep in tough clay, the ditcher was geared to travel at a speed of 2 feet per minute. If kept up without interruption for 10 hours, this would mean 1,200 lineal feet of trench. Of course, there are usually some delays that cut down the day's output, as stated below.

Now, as to the cost of operation and the average daily output under the conditions above given. It takes three men to run this machine: an operator, a fireman and a rigger or oiler. In addition to this, add half the wages of a blacksmith, for a blacksmith (without a helper) sharpens the 42 teeth of the buckets and the 13 side cutters in one and a half to two days. This sharpening must be done once a week when working in tough clay. One blacksmith readily takes care of two machines. The 24-h.p. engines that run the machine average 1,500 pounds of coal per 10 hours of steady work. The water is hauled in a tank; and, as one of the teams engaged in backfilling is used for hauling the water at intervals, there is really no appreciable charge for water. If the water haul were long, its cost could be easily estimated by allowing a gallon of water for each pound of coal.

When the machine is digging on the side of a street having a very sharp crown, it is necessary to lay "blocking" for the wheels on the lower side to run on. This must be done in order to keep the whole machine level and insure securing a trench with sides that are plumb. In dry, tough soils it is often not essential that the sides of the trench be plumb, but in wet soils, or wherever the ground caves readily, a slight overhang of either side causes caving. It is astonishing how little the overhang need be to cause caving in a treacherous soil. Of course, bracing can be placed just as fast as the machine moves ahead, but even the five minutes that the trench remains unbraced may cause a slide of earth in treacherous ground; and while such a slide does not stall this machine, it makes extra work. Two men placed blocking, using for the purpose old 3-inch plank and short 8x8-inch sticks. The machine was advancing 2 feet per minute, which gives plenty of time for the two men to bring up the blocking from behind and lay it in front of the wheels. The street on which they were working was more like a country road than a street, as it had an exceedingly sharp crown. On most streets one man attending to the blocking is sufficient, and, where the crown is comparatively flat, no man is needed for this purpose.

As to the daily output, 1,200 lineal feet, 26 inches wide by 7 feet deep, could be dug in this tough ground in ten hours, under perfect management and with a

skilled operator. This would mean nearly 700 cubic yards per day. But with an operator of short experience a fair day's work was 700 lineal feet and a good day's work was 900 lineal feet. The latter is the average figure for a skilled man—and it pays to employ no other kind; an intelligent man, experienced in running a steam shovel, who could command $5 a day elsewhere. The following is the estimate of the cost of operating a trench digging machine of this size and type, made by an observant contractor:

| | Per day. |
|---|---|
| 1 operator | $ 5.00 |
| 1 fireman | 2.50 |
| 1 oiler | 2.50 |
| 1 laborer, "blocking" | 1.75 |
| ½ blacksmith, at $2.50 | 1.25 |
| 1,500 lbs. of coal, at $4 per ton | 3.00 |
| Total per day | $16.00 |

With 900 feet of trench 7 feet deep as a day's work, the cost of excavating is less than 2 cents per lineal foot, or less than 3½ cents per cubic yard. Note that the wages are liberal and the price of fuel is high. The cost of oil and water is so slight as scarcely to warrant consideration in making an estimate of this kind.

Now, as to the charge for interest and depreciation of plant. A Buckeye traction ditcher of a size that will dig a trench 7½ feet deep and 2 feet wide may be bought for $4,800. Allowing 6 per cent. for interest, we have an annual charge of $288. The cost of maintenance should not exceed the cost of maintaining a 40-ton steam shovel, and, as a matter of fact, it would be much less. One should bear in mind that the principal cost of maintaining a steam shovel plant is the cost of track and car repairs. An allowance of $1,000 a year of 150 working days for interest and depreciation on a $4,800 traction ditcher would be liberal. This would be equivalent to about $7 per working day, or less than 1½ cents per cubic yard. Adding this 1½ cents to the 3½ cents gives us a total of 5 cents per cubic yard for excavating clay of a kind that would cost 25 cents per cubic yard by hand.

In discussing the probable cost of maintaining a traction ditcher, one point is very important. The digging buckets are fastened rigidly to the rim of the revolving wheel. There are no moving joints in the digging apparatus in which grit can lodge, so as to cause rapid wear and breakdowns. Of course, the wheel type of trench excavator is limited in the depth to which it can dig. The largest machine thus far made digs a trench 4½ feet wide by 12 feet deep. For trenches of greater depth it will be necessary, therefore, to use some other type of trench excavator. But within these limits the wheel type of machine leaves little to be desired, being rapid, clean cutting and free from wabbling in its cutting, economic of operation and steady in its output under ordinary conditions.

The Buckeye Traction Ditcher Co., Crystal ave., Findlay, O., will, on request, give full information regarding sizes of machines, prices, capacities, etc.

## Paving Materials for McKeesport, Pa.

The following extract from the inaugural address of Mr. W. H. Coleman, mayor of McKeesport, Pa., is of interest, as it gives the result of his investigation of bitulithic and brick as paving materials:

While on the subject of pavement I desire to call your attention to Warren Brothers' bitulithic. This pavement was first laid in 1901, and in the brief period of time that has since elapsed is now in use in 150 different cities to the extent of 6,000,000 square yards. Such remarkable success in such a brief period of time is the best possible evidence that it possesses merit. My study of bitulithic leads me to believe that it is an excellent pavement.

Bitulithic pavement is composed of a stone or macadam foundation, with a wearing surface of 2 inches, consisting of crushed stone to the amount of about 90 per cent., mixed with a certain amount of heated bitumen, and the whole mass cemented together with a special bituminous cement, filling all the voids, making a smooth surface similar to asphalt, on which there is again rolled stone very small in size for the purpose of forming a grit surface, making it more easy for horses to travel.

A street laid with this kind of pavement is easily repaired. The pavement can be removed and replaced, leaving little evidence of replacement. For reasons above stated, it affords a good foothold for horses, and yet the surface is sufficiently smooth to permit it being swept and kept perfectly clean. It comes more nearly being a noiseless pavement than any other, save only wood block.

A special committee, representing the city of Cincinnati, in 1904, after a careful investigation, recommended the use of this pavement, and their favorable report was confirmed by a special investigation made under the supervision of the Citizens' Bulletin of that city.

It has received the indorsement of some of the most prominent engineers of the country, among them C. A. Kenyon, of Indianapolis, who, in reference to the new pavement, says: "It seems to say, 'I am going to make of these stones as good a pavement for cities as they have proven for the country, as easy to clean, cheap to maintain, more durable, good footing for horses, more quiet because elastic, keeping all the good qualities of macadam, doing away with all the impracticable and expensive qualities of it. I have come to the city to stay, and the more you see me the more you will like me, and if you treat me right your children will be glad you got me.'"

These are strong words, but the wonderful success of this pavement during the past six years seems to justify this strong praise. Its success certainly en-

titles the new pavement to consideration by all who are interested in better street pavements.

Before leaving this subject, let me quote you from a report made by the Committee on Street Paving of the American Society of Municipal Improvements, at their thirteenth annual convention, Birmingham, Ala., in October, 1906:

"In large cities the principal kinds of pavements that have been laid during the past year are a relatively decreasing amount of asphalt for new construction, a decreasing amount of granite block, but where laid the blocks are better laid than ever, and almost always on concrete foundations; an increase of the bitulithic pavement; an increase of treated wood block pavements on concrete foundations, in a few cities; a small increase of brick pavements, much being with better bricks, with joints filled with cement grout and laid on concrete foundations."

There is no more reliable information than this. It shows what is being done in the paving line and from it we gather that while some of the old forms of paving are falling into disuse, brick is still holding its own and is slightly on the increase, but also note that brick pavements are being laid on concrete foundations. Brick pavements in the past have been their own worst enemies, as the result of the use of bad brick, poorly laid, and on insufficient foundations. Good pavements can be made from brick, but they must be good brick, properly laid, and on concrete foundations. Let us not consider the man who must tear up the street to make connections. If he does not make the necessary connections at the time the street is improved, let him pay the cost, whatever it may be. Let us look only to the general public, and insist that the proper foundation be laid for the maintaining of the street in the years that are to come.

Again, we should not be influenced too much by first cost. Remember that while abutting property owners pay for the improvement, the general public pay for the cleaning, sprinkling and maintaining of the street, and have a right to say that the work should be properly done in the first instance.

## Trade Publications.

The Chicago Bridge and Iron Works, Throop and 105th sts., Chicago, Ill., issue a handsomely illustrated booklet illustrating the various styles of their elevated steel tanks for water supplies and other purposes, also bridges, chimneys, standpipes, etc., built by them.

The Goldschmidt Thermit Co., 90 West st., New York, send a catalogue showing some interesting repairs made on steamships, locomotives, etc., where heavy and strong repairs were necessary and where long delays and much expense were saved by the use of thermit for making the repairs, instead of replacing the broken parts with new.

The Browning Engineering Co., Cleveland, O., send an illustrated description of their works as a basis for an offer to sell preferred stock for enlargement purposes.

Vulcanite pamphlet No. 7, issued by the Vulcanite Portland Cement Co., Flatiron Building, New York City, contains a paper by Albert Moyer on "Cement Sidewalk Paving: Suggestions as to Method of Construction." It will be sent on request.

Burnham & Ives, bridge and culvert contractors, Bloomington, Ill., have issued four editions of their booklet entitled "Useful Information for Road Officials," which they will send also to other interested persons.

Jeffrey conveying machinery for saw mills, lumber mills and woodworking industries is illustrated in a supplementary catalogue, No. 57B, just issued by the Jeffrey Manufacturing Co., Columbus, O.

The Art Portland Cement Co., Kimmell, Ind., has issued a handsome booklet, descriptive of Parthenon brand of white Portland cement, showing its non-staining properties, its white color, its characteristics as a Portland cement by chemical analysis and physical tests, and the opinions of those who have used the sample shipments which have been sent out.

The De la Hunt automatic siphons for flushing street sewers, septic tanks, etc., are described in a new booklet issued by the De la Hunt Flush Tank Co., Cedar Rapids, Ia.

## Trade Notes.

### BRICK.

Grand Rapids, Mich.—The Michigan Sand Brick Co. has been incorporated by H. W. Marsh and G. E. Anthony of Manistee, and William Harrison of Grand Rapids.

Chattanooga, Tenn.—The Southern Clay Products Co. has been incorporated by S. B. Smith, Albert L. Caldwell, Theodore F. King, A. T. Moore and W. M. Elliott. The company will engage in handling clay products, tiling, etc.

### CEMENT.

El Paso, Tex.—The Southwestern Portland Cement Co., recently incorporated, has taken over the Courchesne cement works here, and the Alamagordo cement works. The plant in this city will be greatly enlarged. C. Leonard, of Los Angeles, is president, and O. J. Binford, of Los Angeles, is secretary.

Rushylvania, O.—The Union Portland Cement Co. has been incorporated by Dwight Harrison, Wm. T. McClure, H. Ganong, A. T. Schryver and Emma Beyer.

Oklahoma City, Ok.—The Missouri Portland Cement Co. has been incorporated by T. J. Benkendors and H. W. McNutt of St. Joseph, Mo., and S. T. Bisbee of this city.

Appleton, Wis.—The Badger Portland Cement Co. has been organized and work on the construction of a plant will be begun near Sturgeon Bay, Dorr County, soon. The officers of the company are: President, E. A. Edmonds of the Rhinelander Paper Co.; vice-president, John McNaughton of the Patton Paper Co.; Appleton; treasurer, C. G. Cannon, Appleton; secretary, Challis C. Wayland, Portage.

Charleston, W. Va.—The Superior Portland Cement Co. is completing a large

mill at Superior, Ohio, on the Detroit, Toledo & Ironton railroad, 18 miles north of Ironton, Ohio. It will be an up-to-date mill, the very latest appliances and machinery having been installed. The mill will be in charge if J. B. John, well known in the cement world. The company will start with a capacity of 2,000 barrels per day, and expects to begin shipping about August 1. The company's general offices will be in Charleston, W. Va.

Chicago, Ill.—The Allis-Chalmers Co. of this city has closed a contract with the Asano Cement Co. of Tokio, Japan, for its Moji plant, consisting of two 755 h. p. alternating current generators, including two cross compound Corliss engines and the complete cement machinery and auxiliary appurtenances for the new plant.

Harvey, Ia.—The Kansas City Portland Cement Co. has about concluded arrangements for the establishment of a cement mill here of 2,500 barrels capacity. W. E. Fashier of this city is interested.

Fond du Lac, Wisc.—T. E. Dockery, M. McCugo and W. F. Bruett will organize a cement company and erect a manufacturing plant here.

Mason City, Ia.—The Iowa Portland Cement Co. will begin operations here in a short time.

Colorado Springs, Colo.—The Interstate Cement Co. has been incorporated and will begin plans soon for constructing a plant.

Butte, Mont.—Capitalists of this city have organized the Butte Portland Cement Co. and will build a large plant.

Cleveland, O.—Elizabeth C. Hackenberg asked the common pleas court, April 10 to appoint a receiver for the Iroquois Portland Cement Co. She also asks for an injunction to prevent the refinancing of the corporation. She claims that the company is insolvent and that it has been grossly mismanaged.

Hays City, Kansas.—Special.—Work has begun on the new 1,000 bbl. cement plant for the Uncle Sam Portland Cement Company, at Yocemento, between this city and Ellis, on the Union Pacific Railroad. The Freeborn Engineering and Construction of Kansas City, Mo., are engineers and also have the contract for the construction.

Castalia, O.—The grinding department of the Castalia Portland Cement Co. was burned, Mar. 29, entailing a loss of $50,000.

Marinette, Wis.—The Huron Portland Cement Co. has been organized by B. F. Berry, J. B. Ford, H. J. Paxton and E. L. Ford.

Butte, Mont.—The Three Forks Portland Cement Co. has been incorporated by James Pingree, Joseph Scowcroft, C. Browning, M. Boetscher, Aman Moore, J. Gibson and Hiram Pingree of Ogden, Utah; Wm. Newton of Denver; J. D. Slemons and F. T. McBride of Butte. The company owns 3,000 acres of cement deposits 5 miles west of Logan and will expend $600,000 in the erection of a cement plant.

Detroit, Mich.—Lawson E. Becker of Fenton, took formal possession as receiver of the Aetna Portland Cement Co. April 8, at Fenton and the offices in this city. He was appointed receiver in September, 1906. At that time, however, R. D. Evans, president of the company, was absent in Europe and an appeal was taken to the supreme court pending his return. Mr. Evans came back recently and agreed to the appointment of a receiver.

Toronto, Ont.—The Erie Portland Cement Co. has been incorporated to manufacture all kinds of cement, cement products, artificial brick, etc., by L. A. Sandy, D. Forrester, and R. D. Moorhead.

San Francisco, Cal.—The Henry Cowell Lime & Cement Co. of this city will erect a cement plant at Concord, Cal.

### CONCRETE BLOCKS.

Hibbin, Minn.—The Northern Cement Construction Co. of this city will locate its plant in the new town of Nelson, adjoining Hibbing.

Chicago, Ill.—The Chicago Cement Stone Co. has been incorporated to manufacture concrete machinery by Fred W. Dunn, Herman Hausmann and Charles F. Gleaser.

Strathcona, Man.—Local business men are organizing a company to establish cement block works.

Truman, Minn.—Harry Fuller has taken the local agency for the Fairmont Cement Stone Co.

Los Angeles, Cal.—Special.—The Reinforced Concrete Pipe Co. has been organized to manufacture reinforced concrete pipe under the patents of the Reinforced Concrete Pipe Co. of Jackson, Mich., in the states west of the Rocky Mountains. Plans have ben perfected for the erection at some point along the Los Angeles river of a large foundry and machine shop. The officers of the new company are: President, Geo. P. Griffith; vice-president, Arthur S. Bent; treasurer, R. J. Waters; secretary, C. A. Mead.

Dallas, Tex.—The Formic-Aldehyde Cement Co. has been incorporated by G. C. Finsk, J. R. Berry, J. R. Parker and others.

Appleton, Wis.—Special.—J. A. Silver, who has been in general contracting business for ten years, has turned his business over to a stock company to be known as the Sterling Engineering and Construction Co., with headquarters at 406 Uihlein Building, Milwaukee, Wis. The new company has also acquired the reinforced concrete construction business of Sponholz & Co.

New concrete block companies: Waconia, Minn.—H. Harthun.

Sherburne, Minn.—Keil & Mickelson.

Rice Lake, Wis.—J. L. Burnett and T. Dorgan.

Valley City, N. D.—Peter Konczk.

Faribault, Minn.—Perkins & Thonet.

Elliott, Ia.—J. E. & C. F. Walker, F. M. Jones and Horace Cloud.

Marathon, Ia.—H. A. Holmes.

Terry, Mont.—J. W. Stith.

Stevens Point, Wis.—Roy & Harwood.

Lamberton, Minn.—Lamberton Cement Block and Tile Co.

Watertown, S. D.—Watertown Cement Construction Co.

Sheboygan, Wis.—Wm. Peterson and Thomas Moore.

Miles City, Mont.—Harry Siems.

Medina, N. D.—Jacob Klete and F. E. Hulse.

Watsonville, Neb.—H. E. Pierce.

Montevideo, Minn.—H. L. Bigert.

Dows, Ia.—Bangs Bros.

Rockwell City, Ia.—E. Z. Smith.

Cincinnati, O.—Cincinnati Concrete Pressed Brick Co.; J. R. Long, W. S. Howe, Fremont Stevens and others.

Kenosha, Wis.—Kenosha Cement and Construction Co.; Henry G. Butler, Wm. Butler and Thomas Bennett.

Chicago, Ill.—Dearborn Cut Stone Co.; A. Fred Colgren, Chas. A. Colgren, A. William Colgren.

Spring Valley, O.—The Spring Valley Concrete Co.; S. W. Button, J. F. Stump, G. W. Snook, Eliza F. Stump and others.

Guthrie, Okla.—New York Concrete Stone Co. of Guthrie and New York; G. V. Pattison, H. W. and L. E. Pentecost, of Guthrie.

Oklahoma City, Okla.—The Pioneer Concrete Mfg. Co.; Geo. E. Swisher, E. P. Guthrie, N. P. Swisher and N. D. Guthrie.

Saginaw, Mich.—Saginaw Concrete Stone Co.; Lloyd M., Robert K. and Ard. E. Richardson.

Janesville, Wis.—Janesville Cement Shingle Co.

Jackson, Miss.—Concrete Cement Tile Co.

Milwaukee, Wis.—Wisconsin Stone and Cement Co.; Wm. A. Aschmann, Herman Frieschmidt, Bernard H. Berendsen.

Newcastle, Pa.—Newcastle Concrete Co.

Wilkesbarre, Pa.—Brillsford Artificial Stone and Tile Co.

Springfield, O.—J. H. McMillan.

### PURCHASE OF MACHINERY.

Winchester, Va.—Special.—Geo. A. Cook advises us that he is in need of a rock crusher to crush sand rock and sift the same ready for plastering or stone masonry.

Cadiz, Ky.—Special.—W. B. Woodruff, of the Woodruff Planing Mill Co., desires prices from manufacturers of tile machinery on making tile to be used in the ground.

Pella, Ia.—Special.—Ira J. Stoddard, cy. engr., is in the market for second-hand engineer's Y level.

### PURCHASE OF MATERIALS.

Mayfield, Cal.—Special.—C. A. Philbrook desires to communicate with manufacturers of road covering, such as tarvia, asphaltum compounds, etc. Also with people representing various patented pavements on the market. Several miles of road will be built in this vicinity and considerable street work done in the near future.

### MISCELLANEOUS.

New York City.—Special.—The Goldschmidt Thermit Co. has removed its offices to the fourteenth floor of the West Street Bldg., 90 West st. The company also opened a Pacific coast branch, April 1, at 432-436 Folsom st., San Francisco, under the management of L. Heynemann, to conduct business in California, Oregon, Washington and Nevada.

### SEWER PIPE.

Crawfordsville, Ind.—William Griffith, Fred Doherty and W. F. Robb, of this city, contemplate the establishment of a factory in Missouri for the manufacture of corrugated steel sewers.

Muscatine, Ia.—The Muscatine Clay and Tile Co. has been incorporated to manufacture brick and tile of pulverized clay, by B. F. Greiner, Elijah Baker, Fred Garrison and J. W. Ells.

Bancroft, Ia.—The Northwestern Drainage Construction Co. will erect a tile plant here.

Albany, Ga.—The National Brick and Tile Co. has been incorporated, and will erect a plant at once. Those interested are S. W. Smith, W. N. Ticknor, R. M. Thompson and T. M. Nelson, of Albany, and J. S. Kennedy, of New York City.

## Patents Concerning Cement and Its Uses.

835,724. Temporary Framing for Use in Concrete Work. Robert Anderson, Cincinnati, O.

835,730. Railroad Tie. Jas. S. Killen, Darlington, Ind.

835,742. Process for Treating Bricks, Stone and Artificial Stone. Thos. D. Ball, Lamar, Mo.

835,758. Tension Member for Reinforced Concrete. Julius Kahn, Detroit, Mich.

835, 769. Concrete Wall Construction. Ernest T. Wiederbolt, St. Louis, Mo.

835,792. Chimney. Howard T. Keltie, Joliet, Ill.

835,827. Concrete Wall. Virgil F. Little and Geo. I. Gavett, Ithaca, N. Y.

835,769. Concrete Wall Construction. Slabs and the Like of Plastic Material. Alfred Gasfary, Markranstadt, near Leipsic, Germany.

835,885. Fence Post. Geo. F. Greene, Detroit, Mich.

835,967. Molding Machine. Earl L. Martin, Woodburn, Iowa.

836,017. Building Block. Jas. A. Douglass, Alliance, O.

836,128. Cement Fence Post. John F. McElroy, Cedar Rapids, Iowa.

836,190. Mixer for Concrete, Cement or Other Substances. Wm. J. Judd, New York, N. Y.

836,191. Mixing Machine. Wm. J. Judd, New York, N. Y.

836,310. Fireproof Building Construction. John A. Ferguson, Denver, Colo.

836,368, 836,369. Process of Making Concrete Building Walls. Avelyn I. Dexter; Birmingham, Ala.

836,426. Cement Block Machine. Wm. E. Yeocum and Geo. C. Cramberg, Dallas City, Ill.

836,448. Building Block Machine. Samuel A. Latimer, Bangs, Tex.

836,473. Cement Post. Lewis H. Stoner, Albany, Ind.

836,589. Cement Building Block. Jas. Layfield and Albert V. Crisp, Vancouver, B. C.

836,608. Building Block Machine. Clifford F. Sanford, Bowling Green, O.

836,619. Reinforced Concrete Construction. Anthony Tony, Napa, Cal.

836,667. Concrete Wall Mold. Alvin C. Burns, East Lake, Ala.

836,683. Concrete Building Construction. Jas. B. Hinchman, Denver, Colo.

836,727. Cement Block. Jason M. Woodiwiss, Mineral Wells, Tex.

836,798. Concrete Mold. Chas. D. Brookshier, Linton, and Jas. A. Ball, Thorntown, Ind.

836,903. Combined Curb and Gutter. Benj. H. Sturman, Pottsville, Pa.

836,908. Construction of Walls of Buildings. John N. Wolfe, Lancaster, O.

837,101. Apparatus for Building Hollow Concrete Structures. John H. McCoy, Harrisville, Pa.

837,163. Building Block. Albert D. Whisler, Benton Ridge, O.

837,165. Finishing the Faces of Concrete Blocks. Geo. C. Wright and Theo. V. Galassi, San Francisco, Cal.

837,169. Anhydrous Hydraulic Cement and Process. Edward J. Winslow, Chicago, Ill.

837,236. Fence Post. Geo. W. Mann, Leslie, Mich.

837,290. Composite Brick. Laurence Eikus, Indianapolis, Ind.

837,328. Culvert Mold. Edgar T. Morris, Elburn, Ill.

837,418. Means for Mounting Window Sashes and Trimmings Therefor in Concrete Walls. Harry McCann, Hamilton, Ont., Can.

837,520. Machine for Making Concrete Blocks. Wallace G. Tower, Kansas City, Mo.

837,550. Block Molding Machine. Elmore N. Edwards, Alva, Okla.

837,572. Building Block. Ernest V. Johnson, Chicago, Ill.

837,662. Building Block Mold Core. Frank A. Borst, South Bend, Ind.

837,717, 837,718. Process of and Apparatus for Making Cement Compounds. Hubert M. Perry, Chicago, Ill.

837,757. Apparatus for Making Reproductions of Plastic Objects. Thos. C. P. Treleaven, New York, N. Y.

837,760. Mold. Albert D. Whisler, Benton Ridge, O.

837,918. Process for Manufacturing Cement from Blast Furnace Slag. Heinrich Colloseus, Berlin, Germany.

837,938. Automatic Cement Brick Machine. Benj. W. Leggett, Eaton Rapids, Mich.

838,197. Molding Device for Fence Posts and Like Non-Tubular Articles. John J. Luck, Aurora, Ill.

838,226. Method of Forming Hollow Concrete Bodies. Joseph Westenhuber and Anton Wehrle, Toledo, O.

838,255. Railway Tie. John F. Kaminsky, Mildred, Pa.

838,278. Mold. John F. Schwartz, Alma, Mich.

838,406. Process and Apparatus for the Construction of Slabs of Artificial Stone, etc. Adalbert Hermann, Vienna, Austria-Hungary.

838,439. Concrete Mixer. Sydney A. McGill, Bowen, Ill.

838,490. Mold for Making Concrete or Cement Posts. Robert F. Wright, Circleville, O.

838,523. Chimney Cap. Joseph R. Cochran, Columbus, O.

838,582. Wall Construction. Herman E. Rackle, Cleveland, O.

838,592. Fence Post. Perry E. Smith, Detroit, Mich.

838,704. Mold for the Manufacture of Concrete Building Blocks. Joseph B. Francisco, Columbus, O.

838,737. Mold for Concrete Posts. Walter J. Moore, Sterling, Ill.

838,844. Building Block. John H. Clayton, Nashville, Tenn.

838,934. Collapsible Core for Pipe-Molding Apparatus. Newton Baldwin, Coldwater, Mich.

838,935. Molding Machine. Newton Baldwin, Coldwater, Mich.

839,021. Concrete Construction. Wm. T. McCarthy, Brooklyn, N. Y.

# IMPROVEMENT AND CONTRACTING NEWS

## *PAVING.*

Guadalajara, Mex.—The Mexican Asphalt Paving Co. has completed 30,000 sq. meters of asphalt paving, and orders have been placed for much additional paving.

Dowagiac, Mich.—Judge Des Voignes has dissolved the injunction against this city and the paving contractor, restraining them from paving the east end of Spaulding st.

Huntington, Ind.—Crushed stone, with cement curbs and gutters, will be used extensively hereafter in improving the streets of this city, and particularly the residence streets. A recent report of State Geologist Blatchley says the limestone in the edge of this city is among the best road material in the State.

### CONTEMPLATED WORK.

Brewster, Minn.—Cement walks are contemplated.

Marshfield, Ia.—Paving is urged for Central ave.

Austin, Minn.—Paving is contemplated for Oakland ave.

Lindsey, O.—Paving is proposed for Main st. this summer.

Corning, Ia.—The question of paving is being urged.

Ecorse, Mich.—Voted to issue bonds to pave River st.

Harrisville, Mich.—Voted to issue bonds to build sidewalks.

Billings, Mont.—Asphalt paving is contemplated for Yellowstone ave.

Newcastle, Ind.—Bitulithic paving is to be given a test in this city.

Rochester, Minn.—Plans will be prepared for paving W. Zumbro st.

Palmyra, Ill.—Voted to issue $3,000 bonds for sidewalk purposes.

Griffin, Ga.—Council favors a bond election for street improvements.

Lancaster, Minn.—Voted to issue bonds to build a road and a bridge.

Liberty, Miss.—Will vote May 7 on the issue of bonds for public improvements.

Bloomington, Ill.—Clinton st. will be paved with asphalt. Cy. Engr. Folsom.

Martin's Ferry, W. Va.—Council has decided to pave six streets this summer.

Duluth, Minn.—Sandstone block paving has been recommended for St. Croix ave.

Auburn, Ind.—About 3 miles of street paving is contemplated here during the summer.

Lock Haven, Pa.—The question of street paving is being discussed. Mayor Stevenson.

Milwaukee, Wis.—Permanent improvement for streets in 23 wards is contemplated.

Little Falls, N. Y.—Brick paving is desired for Elizabeth st., from 6th to Lock.

Hobart, Okla.—Will vote, May 14, on the issue of $15,000 street improvement bonds.

Henderson, Tenn.—Grading and gravelling is contemplated for the business streets.

Massillon, O.—The paving of S. East, Summitt and Railroad sts. has been authorized.

Woodlawn, Ala.—Will vote, May 21, on the issue of additional street improvement bonds.

Hyde Park, Vt.—Voted to issue $35,000 bonds for building concrete walks. Village trustees.

Durham, N. C.—Will vote, May 7, on the issue of $275,000 bonds for improving the streets.

Huntington, Tenn.—Will vote on the issue of bonds to gravel the streets. Mayor Murray.

Uniontown, W. Va.—Will vote, May 21, on the issue of bonds for paving, curbing and sewers.

Knoxville, Tenn.—The approaches of the Clinch ave. viaduct are to be cleaned and paved.

Delhi, O.—Brick paving is proposed for Lincoln ave.

Dillondale, O.—Paving is proposed for various streets.

Napanee, Ind.—About two miles of street will be paved.

Freeport, Pa.—Bids will be asked soon for grading, curbing, etc.

Benton Harbor, Mich.—Paving is contemplated for Green and Stevens aves.

Independence, Mo.—Grading and macadamizing Woods Chapel Road is proposed.

Kittanning, Pa.—Bids will be asked soon for grading, paving and curbing.

Wagoner, I. T.—Many street improvements are contemplated. H. H. Hellen, cy. engr.

Beaver Falls, Pa.—Bids will be asked for paving, curbing, etc. H. T. Barker, cy. engr.

Huntsville, Ala.—Paving is proposed for the principal business streets. R. E. Smith, mayor.

Des Moines, Ia.—City Engineer has prepared resolution for paving E. 16th with vitrified brick.

Decatur, Ala.—Council has decided to pave about 5,000 lin. ft. of streets and construct sidewalks.

Shawano, Wisc.—Plans and specifications are being prepared for several blocks of tar macadam paving, curbs and gutters.

Leipsic, O.—Bids will be asked soon for building sawed stone or cement sidewalks on 12th st. H. Moenter, clk.

Burkesville, Ky.—The construction of a 30-mile turnpike between this city and Columbia, is contemplated by the Commercial Club of both towns.

Fostoria, O.—Estimates for paving various streets have been furnished by Riggs & Sherman, engrs. of Toledo, who will also prepare plans.

El Reno, Okla.—About 2½ miles of asphalt paving is contemplated. R. N. Whittlesey, cy. engr.

Ballard, Wash.—Brick paving is contemplated on Broadway st. and Ballard ave. Mayor Peck.

Lawrence, Kans.—Bids will be asked soon for considerable brick paving. Holland Wheeler, cy. engr.

Kokomo, Ind.—Plans and specifications will be prepared for paving Sycamore st. with asphalt.

Pioneer, O.—Will vote, May 6, on the issue of bonds for improving highways and building bridges.

Green Bay, Wis.—The property owners on Madison st. have petitioned for asphalt paving. Cy. Clk. Kerr.

East St. Louis, Ill.—More than 5 miles of granitoid sidewalks will be constructed during the summer.

Muskogee, I. T.—This city contemplates about 6 miles of brick and asphalt paving. M. A. Earl. cy. engr.

Mason City, Ia.—The estimated cost of paving E. 8th st. with asphalt is $20,000 to $24,000.

Van Buren, Ark.—An ordinance has been passed for paving Main st. with brick. E. M. Bacharach, cy. engr.

Augusta, Me.—Creo-resinated wood block paving is contemplated on Kennebec bridge. W. B. Getchel, cy. engr.

Aberdeen, Wash.—The new council has provided for street improvements, including the residence streets.

Newark, N. J.—Resolutions for 13 blocks of granite block paving were favorably acted upon, April 18.

Ann Arbor, Mich.—The city clerk has been directed to ask for bids for constructing walks on Traverse st.

Chattanooga, Tenn.—The entire city will probably be organized into improvement districts. Mayor Frierson.

Bennettsville, S. C.—Voted to issue $70,000 bonds for street, water and sewer improvements. Mayor Hodges.

Wilmington, Del.—The street and sewer department adopted a list of 153 streets, April 16, to be paved and improved.

Benton Harbor, Mich.—A resolution was adopted, April 15, for paving Hull ave. with asphalt. A. H. Burger, cy. clk.

Ft. Wayne, Ind.—The board of pub. wks. ordered, April 15, plans constructed for about 7 miles of new cement walks.

Martinsville, Ind.—An ordinance has been passed to pave Pike st. with brick, on gravel base. Cy. Engr. Johnson.

Lorain, O.—A resolution was passed, April 15, providing for the paving of Reid st., from Franklin st. to 5th ave.

Onawa, Ill.—Objections will be heard May 6 on the proposed construction of cement sidewalks. Geo. Underhill, cy. clk.

Downer's Grove, Ill.—Special.—J. S. Lozier says he has plans for $100,000 worth of paving to be done in the near future.

Huntsville, Ala.—Council adopted an ordinance, April 16, for paving the street around the public square with vitrified brick.

Des Moines, Ia.—Resolutions have been prepared for paving a number of streets with creosoted wood blocks and vitrified brick.

South Orange, N. J.—Ordinances have been passed for constructing cement sidewalks in a number of streets. H. Stacy Smith, chm. twp. com.

Ensley, Ala.—The street committee of city council visited Birmingham, April 12, to inspect the bitulithic pavement in use in that city.

Topeka, Kans.—The streets and walks committee has recommended the construction of 23 blocks of new paving and 5 blocks of repaving.

Elkhart, Ind.—A plan is being formulated by A. H. Beardsley and others for constructing a boulevard along the St. Joseph river bank.

Trenton, N. J.—Specifications are being prepared for paving a large number of streets with asphalt and Belgian blocks. Abram Swan, Jr., cy. engr.

Plainfield, N. J.—Council passed an ordinance, April 9, providing for permanent pavements in the business section of the city. A. J. Gavett, cy. engr.

Provo, Utah.—Council passed four ordinances, April 8, providing for sidewalk paving in districts Nos. 5, 6, 7 and 8. Objections will be heard May 4.

South Bend, Ind.—Specifications have been approved for 10,000 sq. yds. of asphalt paving on Main and Jefferson sts. and 16,000 sq. yds. of brick paving on several streets.

Smoky Hollów, Minn.—Voted to issue bonds to build roads, and bids are asked until June 10 for the sale of bonds. Jas. H. Cosner, clk. bd. supvrs., Swatara P. O., Minn.

Salt Lake City, Utah.—The property owners on East First South st., between Second East and Thirteenth East sts., have decided upon Utah asphalt for paving that thoroughfare.

CONTRACTS TO BE LET.

Cohoes, N. Y.—Bids are asked until May 7 for paving Congress st. alley. Cy. Clk. Ellicott.

Alexandria, La.—Bids are asked until May 7 for paving 4th st. with asphalt. F. S. Hoyt, cy. engr.

Winterset, Ia.—Bids are asked until May 6 for 950 sq. yds. of brick paving. W. R. Scott, cy. clk.

Hamilton, O.—Bids are asked until May 4 for brick or asphalt paving on S. 2nd and Maple ave. B. P. S.

Trenton, N. J.—Bids are asked until May 7 for repairing asphalt streets. Harry B. Salter, cy. clk.

Knoxville, Ia.—Bids are asked until May 6 for constructing cement walks. L. K. Butterfield, cy clk.

Mitchell, S. D.—Bids are asked until May 6 for constructing cement sidewalks. J. G. Markham, cy. audt.

Iowa City, Ia.—Bids are asked until 2 p. m., May 3, for constructing brick crossings. F. H. Dondore, cy. clk.

Louisville, Ky.—Bids are asked until May 12, for 15 blocks of brick paving. J. P. Claybrook, cy. engr.

Ashland, O.—Bids are asked until May 6 for grading, paving and curbing W. Washington st. A. S. Milber, mayor.

Racine, Wis.—Bids are asked until May 4 for grading a large number of streets. P. H. Connolly, chm. B. P. W.

Franklin, Pa.—Bids are asked May 3 for paving and curbing 1 mi. of streets. Phil Engelskirger, cy. clk.

Washington, Ind.—Sealed bids are asked until May 7 for constructing a gravel road. Thos. Nugent, co. audt.

Decatur, Ind.—Bids are asked until May 7 for 8,760 sq. yds. of paving, using paving block with stone curbing. C. Vogt, cy engr.

Newark, N. J.—Sealed bids are asked until May 2 for brick paving on Austin, Duryee, Fifth, Fourth, South Fourteenth, South Tenth, South Twelfth, Stanton and Wall sts., and Avon, Clifton, Fairmount, Hillside and Ridgewood aves., involving a large amount of work. Morris R. Sherrerd, chief engineer.

Salem, Ind.—Bids are asked until May 6 for constructing a gravel road in Vernon twp. Sam G. Ellis, co. audt.

Chagrin Falls, O.—Bids are asked un- May 4 for paving 2 streets with brick. W. P. Rice Eng. Co., Cleveland.

Albany, N. Y.—Bids are asked until May 6 for improving Western ave. Isidore Wochman, clk. bd. contr. and supt.

Cleveland Heights, O.—Sealed bids are asked until May 7 for improving Fairmount boulevard. W. G. Phare, vil. clk.

Iowa City, Ia.—Sealed birds are asked until May 3 for constructing cement and plank sidewalks. F. H. Dondore, cy. clk.

Louisville, Ky.—Bids are asked until May 18 for paving streets with asphalt. Joseph P. Claybrook, cy. engr.

La Crosse, Wis.—Bids are asked until May 10 for paving Market st. with macadam with concrete curb and gutter. B. P. S.

Ft. Benjamin Harrison, Ind.—Sealed bids are asked until May 18 for constructing cement walks at this post. Geo. H. Penrose, Q. M., Indianapolis, Ind.

Clinton, Ind.—Sealed bids are asked until May 15 for constructing 10,350 sq. yds. of brick paving. B. F. Harrison, cy. clk.

Burlington, Ia.—Sealed bids are asked until May 6 for paving alley No. 8 with brick or concrete. J. F. Winters, cy. engr.

Bernardsville, N. J.—Bids are asked until May 13 for macadamizing 5,450 ft. of road. John D. Cross, chm. twp. com. Bernards twp.

Brazil, Ind.—Bids are asked until May 7 for constructing 23 1-2 mis. of gravel roads in Harrison twp. Jas. L. Burns, co. audt.

Carthage, Ill.—Bids are asked until May 4 for paving Main st. with brick and stone. Orville F. Berry, chm. bd. local impvts.

Crookston, Minn.—Sealed bids are asked until May 14 for asphalt paving, curbing and drain tile on Houston ave. A. M. Childs, cy. clk.

Carroll, Ia.—Sealed bids are asked until May 7 for constructing 1,250 sq. yds. of brick paving on concrete base. S. H. Johnston, mayor.

Vincennes, Ind.—Sealed bids are asked until May 7 for constructing 1 1-3 mis. of gravel road in Windsor twp. John T. Scott, co. audt.

Bluefield, W. Va.—Bids are asked until May 16 for 38,000 sq. yds. of brick and 6,300 sq. yds. of macadam paving. E. Bond, prest. bd. supvrs.

Fredericksburg, Va.—Sealed bids are asked until May 4 for improvements to the government roadway here. Major M. Gray Zalinski, Q. M., Wash., D. C.

Vancouver Barracks, Wash.—Bids are asked until May 6 for constructing cement walks, curbs, steps, crosswalks, etc. Constr. Q. M.

Dodgeville, Wisc.—Sealed bids are asked until May 7 for building cement sidewalks and crossings on certain streets. Henry Halverson, clk. B. P. W.

White Plains, N. J.—Bids are asked until May 6 for 2,000 sq. yds. of asphalt block paving on Orawanpun and Church sts. Peter Paulding, vil. clk.

Independence, Kas.—Sealed bids are asked until May 7 for constructing 14 blocks of brick paving and 8,088 ft. of concrete curb. F. N. Sickel, cy. clk.

Cincinnati, O.—Bids are asked until May 3 for 10,000 sq. yds. of paving and 3,920 lin. ft. of granite curb on Harrison ave. C. N. Dannenhower, cy. engr.

Benzonia, Mich.—Bids are asked until May 5 for building 1 mi. of public road or highway on the beach on the north side of Crystal Lake. Wm. J. Pettit, supvr.

Columbus, O.—Sealed bids are asked until May 3 for constructing a highway at Painesville and until May 9 for one at Jefferson. Sam Huston, State Highway com.

Ridgewood, N. J.—Sealed bids are asked until May 7 for macadamizing 80,000 to 100,000 sq. yds. of streets. John J. Lannuier, prest. vil. trustees; J. B. Hopper, clk.

Boston, Mass.—Bids are asked until May 4 for constructing brick and granite pavements, Navy-yard, Boston. R. C. Hollyday, ch. bureau yds. and docks., Navy Dept., Wash., D. C.

New Albany, Ind.—Bids are asked until May 4 for paving Thomas st. from Market to Spring sts. with vitrified brick with combined cement curb and gutter. Cy. Engr., Mann.

Jasper, Ind.—Sealed bids are asked until May 6 for grading, draining and paving with stone 2 mis. and 1,680 ft. of the Huntingburg and Ireland road. M. A. Sweeney, co. audt.

Kahaniki, H. T.—Bids are asked until May 15 for constructing roads, sidewalks and grading at the new post here. Capt. E. H. Humphrey, constr. Q. M. U. S. A., Honolulu, H. T.

Cincinnati, O.—Bids are asked until

May 3 for paving Harrison ave. with granite blocks, and until May 10 for macadamizing Dover st. and S. Hudson ave. M. J. Keefe, clk. B. P. S.

Des Moines, Ia.—Sealed bids are asked until May 3 for paving Forest ave. with asphalt, and until May 8 for paving W. Locust st. with creosoted wood blocks. W. W. Wise, chm. B. P. W.

Huntington, Ind—Sealed bids are asked until May 14 for paving Marshall st. from Tipton to Division, with asphalt, cement curb and gutter, cement sidewalks and catch-basins. J. B. Vernon, cy. engr.

Bayonne, N. J.—Sealed bids are asked until May 7 for 6,700 sq. yds. of Telford macadam, 5,646 sq. yds. of brick, and 4,640 sq. yds. of asphalt paving. W. C. Hamilton, cy. clk. F. W. Dalrymple, cy. engr.

St. Louis, Mo.—Sealed bids are asked until May 7 for asphalt, brick, bituminous macadam and granite paving on a large number of streets and fo rpaving 17 alleys with brick. A. J. O'Reilley, prest. B. P. I.

Jeffersonville, Ind.—Sealed bids are asked until May 4 for grading, draining and paving with crushed stone or other materials, a number of roads. John Scheller, chm. Co. comrs.; Geo. S. Parks, co. audt.

Natchez, Miss.—Bids are asked until May 15 for 22,500 sq. yds. of asphalt, bituminous macadam or vitrified brick paving; 12,000 ft. cement curb; 6,000 lin. ft. storm sewer. Mayor; J. N. Hazelhurst, engr., 905 Candler Bldg., Atlanta, Ga.

Oshkosh, Wis.—Sealed bids are asked until May 4 for paving Main st. with asphalt and Church st. with tar macadam. Bids are asked next May 18 for paving Market st. with creosoted wood blocks with sandstone curbing. W. A. Marden, chm. B. P. W.

Peru, Ind.—Bids are asked until May 11 for paving Water st. with brick. Cy. Clk.

Ft. Porter (Buffalo P. O.), N. Y.—Bids are asked until May 5 for constructing cement walks. Q. M.

Chippewa Falls, Wis.—Bids are asked until May 8 for paving Bay st. and Grand ave. with brick. B. P. W.

Madison, Wisc.—Bids are asked until May 7 for macadamizing ten miles of streets. John F. Icke, cy. engr.

Ridgewood, N. J.—Bids are asked until May 7 for macadamizing various streets and roads. J. B. Hopper, vil. clk.

Winchester, Ind.—Bids are asked until May 9 for constructing 27 miles of crushed stone roads. McPougue, co. audt.

Bayonne, N. J.—Bids are asked until May 7 for 6,700 sq. yds. of Telford macadam, 5,640 sq. yds. of brick, 4,640 sq. yds. of asphalt paving. F. W. Dalrymple, cy. engr.

Washington, D. C.—Sealed bids are asked until May 15 for furnishing granite curbing, asphalt paving blocks, vitrified paving blocks, red sewer brick, terra cotta sewer pipe, vitrified sewer invert blocks, repressed vitrified sewer invert blocks, Portland cement, sand, broken stone, paving blocks, and bricks, granite curbing, etc. H. B. F. McFarland, chm. dist. comis.

### CONTRACTS AWARDED.

Butte, Mont.—The contract for constructing cement sidewalks was awarded to Al Saner.

Austin, Minn.—The contract for paving Chatham st. was awarded to Fielding & Shepley, of St. Paul.

Tacoma, Wash.—The contract for paving C st. with brick was awarded to W. J. Murphy for $44,373.

Lawrence, Kans.—The contract for paving Winthrop st. with brick was awarded to Haskins & Ramsey.

Ravenna, O.—The contract for macadamizing a road was awarded to E. E. Morgan of this city for $12,784.

Sheridan, Ind.—The contract for ½ mi. of brick paving was awarded to Nolan & Slattery for $12,000.

Eugene, Ore.—The Warren Construction Co. was awarded the contract for paving Willamette st. with asphalt.

Cincinnati, O.—The contract for paving St. Michaels st. with boulders was awarded to Geo. Stone for $1,819.25.

Marine City, Mich.—Wm. H. Simpson, of Port Huron, was awarded the contract for building all sidewalks in this city.

Rhinelander, Wisc.—The contract for macadam paving was awarded to the Concrete Constr. Co., of Green Bay, for $24,357.

Livingston, Mont.—The contract for constructing cement walks was awarded to the Livingston Concrete Bldg. & Mfg. Co.

Union City, Tenn.—The Troy Paving Co. of Jackson, Tenn., was awarded the contract April 15 for graveling 3 mis. of streets.

Henderson, Ky.—The contract for constructing concrete walks was awarded to the F. M. Payne Contract Co., of Owensboro.

Council Bluffs, Ia.—The Council Bluffs Hydraulic Stone Co. was awarded the contract for 1-2 mi. of cement gutter for $1,161.

Meadville, Pa.—George J. Vetter was awarded a contract for paving 23,311 sq. yds. of Park ave with brick for $54,583.30.

Portland, Ind.—A contract for paving ¾ mi. of streets with brick was awarded to Hipskind & Sons, of Wabash, for $25,000.

Cambridge, O.—The contract for constructing 10,000 ft. of cement sidewalks has been awarded to Port E. Gibson of this city.

Rochester, N. Y.—H. B. Hooker & Son, Wilder Bldg., was awarded the contract April 10 for paving Field st. with brick for $22,680.

Clinton, Ia.—The contract for constructing cement walks, De Witt Park, was awarded April 13, to John Lake & Son for about $2,000.

Acton, Mass.—Chas. E. Harve, of Millbury, was awarded the contract, April 19, for constructing a section of state highway for $8,187.

St. Clairville, O.—The contract for paving several streets was awarded to the Ft. Henry Constr. Co., of Wheeling, W. Va., for $31,159.

Danville, Ill.—McKee & Line secured the contract April 20 for building new cement sidewalks on Oakwood ave. Vermillion Heights.

Kansas City, Mo.—The contract for macadamizing 73d st. from Prospect to Troost aves. was awarded, April 16, to J. Ray Samuel for $6,179.50.

Dayton, O.—The contract for paving Richard st. with asphalt was awarded, April 11, to the Andrews Asphalt Paving Co., of Hamilton, O., for $8,905.

Salem, Ore.—The Warren Construction Co., of Portland, was awarded a contract for paving State st. from Commercial to Church, with bitulithic for $26,000.

Alexandria, La.—The contract for paving and curbing the sidewalks on 16th, Holly, 3rd, Jackson and 13th sts. was awarded to the Southern Constr. Co.

Osceola, Ia.—The contract for paving

the public square with vitrified brick on concrete base was awarded to Wm. Horrabin, of Iowa City, at $2.12 a sq. yd.

Bucyrus, O.—The contract for paving Charles st. with Metropolitan block was awarded April 4 to E. O. Frehwater & Sons, of Chester, W. Va., for $27,000.

Newark, N. J.—The contract for curbing, grading and flagging Watson ave. and paving 8 streets was awarded April 18, to the Newark Paving Co. for $106,824.20.

Dayton, O.—David A. Onkst was awarded a contract, April 16, for grading, graveling and building sidewalks on Barney Heights, for about $12,000.

Grand Rapids, Mich.—Contracts have been awarded as follows: Improving Logan st., Kleote & Vanderveen, $12,635; creosote block paving on Fountain st., Chas. J. Carpenter, $14,129.

Mobile, Ala.—A new contract was made with the Southern Bitulithic Co., of Nashville, April 2, providing for a maintenance clause of 15 years. The old contract was for 10 years.

Lawrence, Mass.—The contract for paving 19,000 sq. yds. of Common st. with Mack vitrified brick on concrete base was awarded to Philip Holland of this city at $2.68 a sq. yd.

Duluth, Minn.—G. J. Johnson was awarded the contract for constructing cement walks in certain streets at prices averaging, on the various contracts about 95 cents a lin. ft.

Alhambra, Cal.—Contracts for grading, oiling, curbing, gutters and sidewalks on Stoneman ave. and 5th st. was awarded April 9 to Ostwald Bros. and on Electric ave. to J. F. Hall.

Waterloo, Ia.—The W. A. Bryant & Sons Co. was awarded the contract for 3 mls. of asphalt paving at $1.79 a sq. yd. or $135,780, which was $12,979 lower than the next lowest bidder.

Atlantic City, N. J.—The Standard Bitulithic Co. was awarded the contract for 38,500 sq. yds. of bitulithic paving on Atlantic ave. by the Pennsylvania R. R. Co., at $3.59 a sq. yd.

Menominee, Mich.—The contract for paving 10,000 sq. yds. of Upper Main st. with tar macadam was awarded, April 6, to John Striffler, of Marinette, Wis., at $1.75 a sq. yd. or $17,500.

Salt Lake City, Utah—The contract for repairs to street pavements was awarded, April 4, to P. J. Moran, for $11,555 and for constructing all stone crossings to Custer & Burt, for $3,640.

Washington, D. C.—The Washington Asphalt Co. was awarded the contract for constructing asphalt block pavements at $1.80 a sq. yd. for 5-in. pavement on gravel base and at $1.65 for 4-in. pavement.

Utica, N. Y.—The Barber Asphalt Paving Co. was awarded contracts, April 19, for paving at $2.12 a sq. yd. The prices submitted on this work averaged from 25 to 30 per cent. higher than last year.

St. Paul, Minn.—James Forrestal was awarded a contract, April 18, for macadamizing Crocus Hill streets. April 18, for $51,979; Fielding & Shepley secures the contract for one street, for $20,384.

Savannah, Ga.—Bids for repairing the asphalt pavements were submitted, April 10, as follows: Asphalt Paving Co., of Georgia, Macon, $1.16 a sq. yd.; Southern Paving Co., Chattanooga, $1.17; Barber Asphalt Paving Co., Phila., $1.30.

Toledo, O.—The contract for paving Wauseon and Orchard sts. was awarded to Garrigan Bros. Metropolitan block will be used.

Wyandotte, Mich.—Special.—The J. C. Conley Co., of Dayton, O., was awarded the contract, April 18, for extending the paving of Biddle ave. about 18,000 sq. yds.; Metropolitan block will be used, at $1.83 a sq. yd, Berea curbing, 58 cts. a lin. ft., excavation, 40 cts. a cu. yd.

Louisville, Ky.—The Barber Asphalt Paving Co. submitted the lowest bid for paving Market st. and Slaughter ave. with asphalt, at $1.97 a sq. yd., 5 yr. guarantees and $2.04 with 10 yr. guarantee. The American Standard Co. bid $2 and $2.50 respectively on 5 and 10 yr. guarantees.

Anadarko, Okla.—Special—The Connelloy Construction Co., of this city and Sioux Falls, S. D., was awarded the contract, April 8, for constructing cement sidewalks and curbs around the court house square, at 13¼ cts. a sq. ft., for sidewalks and 40 cts. a lin. ft. for curbing.

Fremont, Ia.—The contract for furnishing paving brick for 50,000 sq. yds. of paving here was awarded to the Barber Asphalt Paving Co., of Des Moines. The contract for constructing 30 blocks of brick paving was awarded, April 6 to J. W. Turner of Des Moines, at $1.86¾ a sq yd.

Albany, N. Y.—Bids were submitted, April 15, for grading and paving Western ave. as follows: Vulcan Engineering Co., $41,646; Robert Shafer, $39,950; Mulderry Bros., $41,889; Supplementary proposal: Vulcan Engrg. Co., $40,524; Robt. Shafer, $48,390; Mulderry Bros., $40,789; M. F. Dollard, $37,200.

Lima, O. T.—T. J. Mulligan secured the contract for paving N. Main st. as follows: Exca., 30 cts. a cu. yd.; 8 in. sewer tile, 30 cts. a lin. ft.; Metropolitan paving block, $1.41 a sq. yd.; cement curb, 30 cts. a lin. ft.; cement filler, 8 cts.; catch basins, $25 each; extra concrete, $3.25 a cu. yd.; stone headers, 20 cts. a lin. ft.; total, $29,299.25.

New York City—The Asphalt Constr. Co., Madison ave. and 137th st., was awarded a contract for paving 163rd st., Boro of Bronx, as follows: 5,900 sq. yds. iron slag pavement, $2.70; 10,225 sq. yds. asphalt block, $1.82; 2,380 cu. yds. concrete, $4.58; 4,900 lin. ft. old curb, 30 cts.; total, $46,955.

Brooklyn, N. Y.—The Newman Constr. Co., 1127 Willoughby ave., Brooklyn, was awarded the contract for repaving Broadway, Boro of Brooklyn, with granite on concrete base for $79,597.

Oshkosh, Wis.—Bids for asphalt paving on Jackson st. were submitted April 12 as follows: Borber Asphalt Co.—Trinidad asphalt, $2.34 a sq. yd.; cement curb and gutter, 58 cts. a lin. ft.; sandstone curb 80 cts. a lin. ft.; brick gutter, $2.35; Andrews Asphalt Paving Co., Hamilton, O.—Bermudez Lake Asphalt, $2.40; cement curb and gutter, 60 cts.; sandstone curb, 80 cts.

Keyser, W. Va.—The contract for paving street with brick was awarded to the H. D. Brooks Co., of Fairmont, W. Va., for $20,000.

Pueblo, Colo.—The Cleveland Trinidad Paving Co., of Cleveland, O., was awarded the contract for improving Victoria ave. Paving Dist.

Beltsville, Md.—The contract for constructing two miles of the Washington Boulevard was awarded to McDowell & Brown of Ft. Deposit, Md., for $30,000.

Omaha, Neb.—Contracts for constructing ten miles of macadam road have been awarded as follows: Q St. road, E. D. Van Court, at $1.34 per lin. ft., for 10-in. macadam and $1.09 for 8-in. Same contractor also secured the contracts for Leavenworth St. road, 8 in. deep, for $1.09 per ft., and Center St. road, 8 in. deep,

for $1.72 per ft. C. W. Craig & Co. was awarded contract for paving Military Road 12 ft. wide, 8 in. deep, for $1.52 per ft., and for similar paving on Calhoun Road for $1.56 per ft. A contract for grading was also let to Dan Hannan on Military Road to prepare for paving. Grading contracts on what are known as the Brandeis and Stoltenberg Roads, north of the city, were let to J. W. Williams, and grading of south county line road was awarded to M. H. Williams.

Brooklyn, N. Y.—Paving contracts were awarded April 10, as follows: Asphalt blocks, 43d, 48th and 51st sts., $13,754, $20,369 and $19,731 respectively, Hastings Pavement Co., 25 Broad st., N. Y. City; repaving Bush st. with second-hand granite on concrete base, City Excavat. & Constr. Co., 407 Hamilton ave., Brooklyn; repaving Kent ave. with granite on concrete base, Newman Constr. Co., 1127 Willoughby ave., Brooklyn; regulating, curbing and building sidewalks on Van Sicklen st., Chas. Cranford, 44 Court st., Brooklyn.

## SEWERS.

New York City.—P. J. Murray has begun work on the Ingleside sewer, which will be the largest sewer in Queens Borough. The present contract covers 6,700 ft. of mains and will cost more than $200,000.

### CONTEMPLATED WORK.

Traer, Ia.—A sewerage system is contemplated.

Harrisville, Mich.—Vote to construct sewers.

Rushmore, Minn.—Voted to issue bonds for sewers.

Morristown, Tenn.—A sewerage system is contemplated.

Minneota, Minn.—The extension of the sewerage system is urged.

Aberdeen, Wash.—The new council has provided for sewer extension.

Vicksburg, Miss.—Bids will be asked for a storm sewer in China st.

Oskaloosa, Ia.—The question of sewage disposal is being considered.

Oxford, O.—Will vote May 14 on the issue of $50,000 sewerage bonds.

Lancaster, O.—Sewers will be built in Park st. John N. Wolfe, cy. engr.

Wyoming, O.—Plans are being prepared for a sewerage system.—Mayor Taylor.

Ecorse, Mich.—Voted to issue bonds for constructing a general sewer system.

Hobart, Ok.—Will vote May 14 on the issue of $25,000 for a sewerage system.

Rome, Ga.—Will vote May 7 on the issue of bonds for extending the sewerage system.

Linden, N. J.—The question of constructing a sewerage system is being considered.

Bridgeburg, Ont.—Plans have been completed for 8 miles of pipe sewers and septic tanks.

Oelwein, Ia.—Council has taken action towards constructing a sewage disposal plant.

Millville, N. J.—The question of erecting a sewage disposal plant is being discussed.

Barberton, O.—A storm sewer in Wunderlich ave. is contemplated. Harry Alcorn, cy. engr.

Wadesboro, N. C.—A number of citizens are organizing a company to construct a sewerage system.

Ida Grove, Ia.—Final action will be taken by council May 20 on the proposed sewerage system.

Dillon, S. C.—Special.—W. Murchison desires data for installing a private septic tank and filter.

Corona, Cal.—The business men are interested in the question of constructing a sewerage system.

Holdredge, Nebr.—A sewerage system is contemplated.

Ludlow (Covington P. O.) Ky.—Council contemplates constructing trunk sewers this summer.

Benton Harbor, Mich.—A resolution has been passed to build a sewer on Pipestone st. H. Burger, cy clk.

Colville, Wash.—The question of constructing a sewerage system is being considered. Harry Bonner, cy. engr.

Duluth, Minn.—Plans are being prepared for sewer systems in West Duluth with Forty-ninth av. outlet, and in Park Point.

Grossdale, Ill.—Ordinances have been passed by this village and LaGrange providing for the joint construction of a box sewer to drain both towns into Salt creek.

Durham, N. C.—Will vote May 7 on the issue of bonds for the extension of the sewerage system.

Lexington, Ky.—An ordinance has been passed to build a sewer in Patterson st. Thos. D. Combs, Mayor.

Vicksburg, Miss.—Will vote on May 7 on the issue of $200,000 bonds for build- a sewerage system.

St. Augustine, Fla.—Will vote on May 21 on the issue of bonds for installing a complete sewerage system.

St. Paul, Minn.—Preliminary estimates have been submitted for the proposed St. Anthony Park sewer system.

Truckee, Cal.—Will vote on the issue of bonds for installing a sewerage system. W. F. Wilkie, mem. san. com.

Ford, Mich.—The plans and specifications of Mason L. Brown for a general sewerage system have been approved.

Des Moines, Ia.—City council ordered April 15, the construction of a sewer system for Center Drive and Park line.

Wilmington, Del.—A new intercepting sewer along Brandywine creek to drain Rockford and Kentmere is contemplated.

Bartlesville, I. T.—Special.—Voted $40,000 bonds for the extension of the sewerage system. W. H. Whaley, cy. engr.

Girard, O.—Voted to issue sewer bonds and bids will be asked for constructing a trunk sewer and sewage disposal plant.

Winfield, Kas.—Bids will be asked soon for constructing a sanitary sewerage system and septic basins. D. F. Merry, cy. engr.

Dowagiac, Mich.—Voted April 1 to issue $53,250 for constructing trunk sewers. Plans have been prepared. J. S. Haines, cy, surv.

Sandusky, O.—A resolution has been passed to construct reinforced concrete sewers in Arthur, 5th and Scott sts. A. C. Schutz, cy. engr.

Kokomo, Ind.—Plans and specifications are being prepared and bids will be asked soon for constructing South Branch sewer. W. F. Mann, cy. engr.

Bement, Ill.—Special.—Plans, specifications and estimates for a sewerage system have been prepared by the Iowa Engineering Co. of Clinton, Ia.

St. Marys, Pa.—Plans for the proposed new sewerage system and sewage disposal plant will be made by Alexander Potter, of New York City and T. Chalkley Hatton of Wilmington, Del.

Quincy, Ill.—The contract for constructing 1,000 ft. of 3½ ft. 2 ring brick storm sewer was not let April 10 and the plans

will be changed and new bids asked. S. L. Hancock, cy. engr.

Hazelton, Pa.—Specifications have been approved for constructing a sewer in Peace st. The city engineer has been directed to ask for bids for constructing 6 new concrete sewer inlets.

Aurora, Neb.—Petitions are being circulated asking the city council to call a special election to vote on the issue of bonds for constructing a sewerage system in the down town and residence districts.

Red Deer, Alberta.—Special.—L. C. Fulmer, sec-treas. advises us that the time for receiving bids for sewer, waterworks extension, hospital grant, firehall and local improvement debentures has been extended to June 15.

East Rutherford, N. J.—The adoption of the septic tank sewer system for the east end of the borough and a sewer for Carlton Hill, to empty into the Passaic river, has been recommended by the committee. Wm. Gramlick, mgr.

Lexington, Mo.—Special.—J. A. Wilson, cy. engr., says surveys have been made and plans are being prepared for a drainage ditch about 10 mis. long in Lafayette county. The object is to straighten Davis creek, and the work is of a nature to justify the use of a small dredging boat or other ditching machine. Bids will be asked soon.

### CONTRACTS TO BE LET.

Lamar, Colo.—Bids are asked until May 9 for constructing a sewerage system. C. W. Heaton, town clk.

Lawton, Ok.—Bids are asked until May 11 for building brick and pipe sewers. W. R. Julian, cy clk.

Montgomery, Ala.—Bids are asked until May 2 for building sewers in 8 streets. R. S. Williams, secy-treas.

Washington, D. C.—Bids are asked until May 13 for constructing a sewer. H. B. F. McFarland, chm. dist. comrs.

Oshkosh, Wis.—Sealed bids are asked until May 18 for constructing a sewer in 9th st. W. A. Marden, chm. B. P. W.

Boise, Idaho.—Sealed bids are asked until May 8 for constructing a sewer system at Boise Barracks. R. B. Turner, Q. M.

Laporte, Ind.—Bids are asked until May 6 for building sewers on E. Harrison and Rose sts. Hiram Burner, cy. engr.

Utica, N. Y.—Bids are asked until May 3 for building a storm water drain in Pleasant st. J. A. Cantwell, cy. clk.

Springfield, Ill.—Bids are asked until May 20 for sewers for supreme court building. Jas. A. Rose, secy. state.

Binghamton, N. Y.—Sealed bids are asked until May 6 for constructing the 4th ward trunk sewer. D. C. Herrick, cy. clk.

Chillicothe, O.—Bids are asked until May 3 for building an 8 in sewer with inlets in Church st. H. T. Herrmann, clk. B. P. S.

Cincinnati, O.—Bids are asked until May 3 for constructing sewers in Clifford st. and Harrison ave. M. J. Keefe, clk. B. P. S.

Sandersville, Ga.—Bids are asked until May 3 for constructing 6 mis. 8 to 15 in sewers, including manholes, flush tanks, etc. D. L. Cheatham, mayor.

Waco, Tex.—Sealed bids are asked until May 16 for constructing 15 mis. of sanitary sewer extensions. Jas. B. Baker, mayor; R. B. Dickey, cy. secy.

Hastings, Minn.—Sealed bids are asked until May 6 for constructing sewers in Tyler, Ramsey, Vermillion, 2nd, 7th and 8th sts. Chas. Hawkes, cy. clk.

Trenton, N. Y.—Sealed bids are asked until May 7 for building a sewer in Washington and Tyler sts. and Stuyvesant and Hermitage aves. Harry B. Salter, cy. clk.

Madison, Wisc.—Bids are asked until May 10 for constructing three miles of sewers. John F. Icke, cy. engr.

Pana, Ill.—Contracts will be let about the last of May for 30,000 ft. of sanitary sewers varying from 8 to 20 inches. L. S. Ham, cy. engr.

New York City—Bids are asked until May 8 for constructing sewers and sewer basins in various streets in Brooklyn. Bird S. Coler, Boro. prest.

Bronxville, N. Y.—Bids are asked until May 3 for constructing additions to the sewerage system. Geo. H. Rogers, 2543 Third ave., New York City, Engr.

Richmond, Ind.—Sealed bids are asked until May 8 for constructing a sewerage system and a sewage disposal plant. C. W. Merrill, chm. B. P. W. Fred R. Charles, cy, engr.

Elkhart, Ind.—Bids are asked until 10 a. m. May 4 for constructing the 9th and 10th district sewers, 24 manholes and 66 catchbasins. A. M. Smith, cy. engr; T. G. Wilkinson, cy. clk.

Lamar, Colo.—Sealed bids are asked until 8 p. m., May 9, for constructing a sanitary sewer system, requiring 66,805 lin. ft. 8, 12, 15, 18 and 21 in. vitrified sewer pipe. C. W. Heaton, town clk.

Baltimore, Md.—Sealed bids are asked until May 15 for building storm water drains Nos. 2 and 3, including drains, concrete manholes and 102 inlets. Peter Leary, Jr., chm. sewerage comn.

Perth Amboy, N. J.—Sealed bids are asked until May 6 for constructing a trunk sewer involving 800 ft. 6 ft. concrete sewer; 1,700 lin. ft. 6 ft. brick sewer; 10 manholes; 16 receiving basins. Wm. H. Fullerton, st. comrs.

Summit, N. J.—Sealed bids are asked until May 7 for constructing a concrete pumping station, sewage tank and a pumping station trunk sewer, 160 tee branches, 36 lin. manholes, 2 junction manholes, 1 drop manholes, etc. J. E. Rowe, cy. clk.; Wm. S. Logan, cy. engr.

### CONTRACTS AWARDED.

Sarnia, Ont.—Garrett & Sullivan secured the contract for constructing sewers.

Ottumwa, Ia.—N. N. Naugle & Co. secured the contract for a sewer in W. Mill st. for $22,000.

Polo, Ill.—The contract for building sewers was awarded to Stoltz & Sons of Belleville for $26,400.

Escanaba, Mich.—John Laughlin was awarded contracts for constructing sewers in Dousman ave. and 2 alleys.

Galveston, Tex.—The contract for extending sewer laterals was awarded to Trueheart & Jackson for $19,486.

Watertown, S. D.—Hess & Rau secured the contract April 8 for constructing the 3rd ward sewer for $10,500.

Batesville, Ark.—John McCoppin of Little Rock was awarded the contract for building sewers for $12,725.

McKeesport, Pa.—Sewer contracts were awarded April 3 to Frank Erbeck, Bowman Bros. and Spering & Demyers.

Elmira, N. Y.—J. H. & W. S. Walker secured the contract for installing sewer, water and gas services in Church st.

Grand Rapids, Mich.—The contract for building a sewer in Terrace av. was awarded to Vandeveen & Mussell for $1,681.

Beaver, Pa.—The contract for construct-

ing 1,000 ft. of 12 in. sewer in Tailor st. was awarded to John P. Potter of Monaca.

Huntington, Ind.—The contract for extending the Rabbit Run sewer was awarded April 13 to P. Hipskind & Sons for $10,000.

Washington, D. C.—The contract for constructing the Ivy City trunk sewer was awarded April 22 to E. G. Gummel for $12,884.

St. Paul, Minn.—John Lind was awarded contracts, April 11 for building sewers in Ashland ave. for $37,000 and in Lafond st. for $2,450.

Shawnee, Ok.—The contract for constructing a storm sanitary sewerage system was awarded to Chas. T. Derr of Guthrie for $103,277.98.

Des Moines, Ia.—The contract for building section 1 of the Grand View sewer system was awarded April 7 to J. W. Campbell at $1.74 a ft.

New London, Conn.—The F. M. Ladd Co. was awarded the contract for constructing 500 ft. of 24 in. 11,350 ft. of 20 in. pipe and 550 ft. of tunnel for $24,983.

Centerville, Ia.—M. C. McGinnis was awarded the contract for constructing a drainage ditch ½ mi. long between Charlton river drainage dists., Nos. 1 and 2.

Dayton, O.—Contracts for storm water sewers were awarded April 3 as follows: Elm st., G. C. Meyers, $1,296.25; 3rd st., $694; Germantown st., $424 and Adams st., $2,574.98, Norman F. Dill.

Somersville, Mass.—The contract for constructing sewers in Somerville ave., Washington, Hawkins and Lake sts., and Walnut and Whitfield roads, was awarded to Chas. A. Kelley for $4,086.

Birmingham, Ala.—The contract for building a sanitary sewer on S. Limestone st. was awarded to J. J. Fitzgerald as follows: Main sewers, 80 cts. a ft.; branches, 40 cts.; manholes, $35.00; Flushtanks $55; rock excavation, $2.50 a cu. yd.

Larned, Kas.—Special.—The contract to construct sanitary sewer system, consisting of 6,295 feet of 8-10-12 in. pipe was let to The Municipal Construction Co., of Kansas City, Mo., for $4,250.00. N. A. Rowland, cons. engr., McPherson, Kans.

St. Joseph, Mo.—Sewer contracts were awarded April 19 as follows: Peter Swenson, dist. No. 34, 80 cts. a lin. ft.; manholes and inlets, $40 each; dist. No. 84, 77 cts. a lin. ft.; manholes and inlets, $40 each. John Marnell—Dist. No. 73, 73 cts. a lin. ft.; manholes, $32.50; inlets, $35.

## WATER WORKS.

Memphis, Tenn.—Work on the construction of the auxiliary water plant was begun April 16.

Columbia, S. C.—An ordinance has been introduced providing for a permanent water works commission.

Waukegan, Ill.—This city voted April 9 against the purchase of the plant of the Lake Forest Water Co. for $150,000.

Portland, Me.—The Des Moines Water Co. has been organized here for the purpose of constructing, owning and maintaining water works systems and plants with the following officers: President, James R. Parsons, of Yarmouth; treasurer, Walter M. Lovejoy of Portland.

Orange, N. J.—An ordinance was passed April 15 directing the water committee not to reduce water rents when the property owner alleges leakage or waste, unless a test of the meter is made. If the test proves the meter to be correct the property owner must pay $2 but if the meter is inaccurate the committee is authorized to make a reduction in the amount of the bill.

### CONTEMPLATED WORK.

Webster City, Ia.—The water mains will be extended.

Ortonville, Minn.—Will vote May 2 on extending the water mains.

Aurora, Minn.—Additional wells for a water supply are contemplated.

East Palestine, O.—Voted to issue bonds for extending water mains.

Racine, Wisc.—This city voted in favor of municipal ownership of waterworks.

Morrisville, Vt.—Voted to issue $100,000 bonds for constructing a dam.

Eufaula, I. T.—The improvement of the water works system is contemplated.

Cheney, Wash.—Voted to issue bonds for improving the water works system.

Iowa Falls, Ia.—The council will extend the water mains several thousand feet.

Atlanta, Ga.—Voted to issue $350,000 bonds for improving the water works system.

Dillon, Mont.—Plans for a concrete reservoir will be made by Geo. Metlen, cy. engr.

Minot, N. D.—Plans are being prepared for water works and sewers. G. T. Morrow, cy. audt.

Mitchell, Neb.—Voted to issue bonds for constructing a municipal water works system.

Rome, Ga.—Will vote May 7 on the issue of bonds for enlarging the water works system.

Haddonfield, N. J.—Voted to issue $100,000 bonds for constructing a municipal water works.

Red Bank, N. J.—Voted April 11 to appropriate $15,000 for extending and improving the water system.

Niagara Falls, N. Y.—The city engineer is preparing plans for constructing a water works system.

Jackson, O.—Will vote June 4 on the issue of bonds for enlarging and improving the water works system.

Rosalia, Wash.—The business men have organized a stock company and will construct a water works system.

Augusta, Me.—The Augusta Water Dist. will lay 5,300 ft. of 10-in. water main to the Maine Insane Hospital.

Fergus Falls, Minn.—This city has purchased the water system and will probably install a meter system.

Plattsburg, N. Y.—Voted to issue $50,000 bonds for the purpose of acquiring watershed of city water supply.

Charlotte, N. Y.—Voted to isue $18,000 bonds to repair and enlarge the municipal water and electric light plants.

Tilden, Neb.—Special.—Plans for a water works system are being prepared by the Iowa Engineering Co., of Clinton, Ia.

Trezevant, Tenn.—The Business Men's Club has appointed W. G. Ware to investigate the matter of constructing water works.

Springfield, Mass.—Plans for the new Little River water system will be made by Allen Hazen, con. engr. of New York City.

Ashland, Pa.—The water committee is considering the question of increasing the capacity of the reservoir. John Morrissey, chm. com.

The question of issuing bonds for constructing water works systems will be

voted on as follows: Browerville, Minn.; Sauk Rapids, Minn.

Spartanburg, S. C.—Surveys and estimates for installing a water works system will be prepared by J. L. Ludlow of Winston-Salem, N. C.

Ashtabula, O.—Plans for improving the city water system will be made by the Walter P. Rice Engineering Co., of Cleveland. Louis A. Amsden, cy. engr.

Lockport, N. Y.—Governor Hughes has signed a bill providing for an additional bond issue of $60,000 to enable this city to complete a water supply system.

Bellaire, O.—An ordinance was passed April 13 authorizing the board of public service to expend $35,000 for completing the filtration plant, purchasing a new pump, and making other improvements.

The question of issuing bonds for constructing water works has been favorably voted as follows: River Falls, Wis.; Lamont, Ia.; Centralia, Mo.; Bethoud, Colo.; Big Timber, Mont.; Bennettsville, S. C.; Bellevue, Neb.; Bonesteel, S. D.; Comanche, I. T.

The construction of water works system is contemplated at the following places: De Ridder, La.; Canon City, Colo.; St. George, Utah; Viola, Wis.; Carthage, N. Y.; East Grand Forks, Minn.; Prentiss, Miss.; Salem, Ore.; Oakdale, Pa.; Casselton, N. D.; Downybrook, N. D.; Norwood, Minn.; Vernon Center, Minn.; Hoosick Falls, N. Y.; Ponca, Okla.; Tallahassee, Fla.; Dike, Ia.; Prague, Okla.; Commerce, Ga.; Memphis, Tex.

Syracuse, N. Y.—Special—William Miller Booth, constr. engr., 712 Dillaye bldg., advises us that he has been asked to recommend an expert engineer, capable of estimating the value of a water work system now in operation. Municipal ownership is being discussed, and such an authority is required. The names of three men capable of making such valuation and willing to do so for a city in New York State are desired.

### CONTRACTS TO BE LET.

Lisbon, N. D.—Bids are asked until May 6 for laying water mains. M. E. Moore, cy. audt.

Jacksonville, Fla.—Bids are asked until May 5 for sinking an artesian well. Philip Prioleau, cy. engr.

Moorhead, Minn.—Bids are asked until May 6 for laying 1 block of 6-in. water mains. H. E. Roberts, cy. clk.

Madill, I. T.—Sealed bids are asked until May 7 for constructing a water works system. M. Griffin O'Neil, prest. coun.

Waterville, N. Y.—Sealed bids are asked until May 13 for constructing a reservoir. W. G. McLean, chm. bd. water comrs.

Forsythe, Mont.—Bids are asked until May 3 for constructing a water works system. Iowa Engineering Co., Clinton, Ia.

Ft. Bayard, N. Mex.—Bids are asked until May 6 for constructing water mains in certain streets. Chas. Hankes, cy. clk.

Parker, S. D.—Bids are asked until May 7 for constructing Nilsen, Frederickson, Weeks and Laking ditches. E. W. Browne, co. audt.

Washington, D. C.—Bids are asked until May 6 for brass and iron castings, Thos. J. Sullivan, dir. bureau Engraving and Printing.

Zumbrota Falls, Minn.—Bids are asked until May 15 for extending the pipe lines of the water works system. E. F. Davis, vil. recdr.

Pensacola, Fla.—Bids are asked until May 4 for furnishing boilers and accessories at Navy Yard, Bureau Yds. & Docks, Washington, D. C.

Burlington, N. J.—Sealed bids are asked until June 5 for constructing a mechanical filter plant. Geo. O. A. Allison, supt. water comis.

Sioux City, Ia.—Sealed bids are asked until May 7 for erecting a chimney at the Main st. pumping station. G. B. Healy, prest. bd. w. w. trustees.

Brandon, Man.—Bids are asked until May 17 (extended from May 6) for supplying 85 tons of 6 and 8 in. c.i pipe and special. W. H. Shillinglaw, cy. engr.

Zumbrota, Minn.—Sealed bids are asked until May 15 for constructing an extension to the pipe lines of the water works system. E. F. Davis, vil, recdr.

Galveston, Tex.—Sealed bids are asked until May 16 for taking out and replacing 30 strainers in the city's artesian wells at Alta Loma. C. G. Wells, cy. engr.

Columbus, Miss.—Bids are asked until May 7 for laying 2½ mis. of 6 and 8 in. water mains. E. S. Donnell, mayor; Kirkpatrick & Johnson, engrs., Jackson.

Washington, D. C.—Bids are asked until May 8 for furnishing soft wrought iron pipe and bends, c. i. beaded fittings and gate valves. Bernard R. Green, supt. constr.

Ft. Bliss, Tex.—Sealed bids are asked until June 3 for sinking a well, installing deep well pump, deep well pump shelter and trestle, steel tank and boilers, Constr. Q. M.

Carthage, N. Y.—Sealed bids are asked until May 6 for constructing a 12-in. conduit line 14 2-3 mis. long, an intake reservoir, dam and gate house. P. R. Wrape, prest. bd. water comis.

Romney, W. Va.—Sealed bids are asked until June 19 for constructing water mains, a concrete reservoir, wooden tank and steel trestle. Wm. M. Straus, chm. bd. of Regents for Schools for Deaf and Blind.

Albany, N. Y.—Sealed bids are asked until May 6 for constructing 16 reinforced concrete filter tanks, with operating gallery, pumping station and appurtenances. Wallace Greenlach, engr. and supt. bureau of water.

Portland, Ore.—Bids are asked until July 1 for constructing a dam at the outlet of Bumping Lake, Wash., involving 182,000 cu. yds. excavation, 960 cu. yds. concrete masonry, 900 cu. yds. riprap and rockfill, etc. U. S. Reclamation Service, Portland.

Washington, D. C.—Sealed bids are asked until May 21 for constructing the North Platte project near Mitchell, Neb., consisting of 114 mis. of lateral ditches, involving 650,000 cu. yds. loose and solid rock. Jas. R. Garfield, secy. Reclamation Service.

Atlanta, Ga.—Builders of all types of pumping engines are invited to appear before the board of water commissioners at 3 p. m., May 4, to demonstrate what pumping engine they build that will do the duty required of them in the direct pumping system. Bd. water comis.

Washington, D. C.—Bids are asked until May 28 for constructing sections 2 and 6 of South Canal and structures, sections 2 and 8, involving 670,000 cu. yds. of canal, excavation, 7,200 cu. yds. of concrete and 1,295 lin. ft. of tunnel, in connection with the Belle Fourche project, South Dakota. Jas. Rudolph Garfield, Secy. Interior.

### CONTRACTS AWARDED.

New Orleans, La.—The contract for laying 12,000 ft. of water mains was awarded to J. W. Percival.

Hillyard, Wash.—The contract for laying the water mains of the Valleyford Water Co. was awarded, April 13, to O. A. Woodward.

Hamilton, O.—The contract for the new water works pumping machinery was awarded to the Laidlow-Dunn-Gordon Co., of Cincinnati, April 18.

Albany, N. Y.—The contract for laying pipes for extending the high pressure service of the water department was awarded to Fred A. Shaw.

Sioux City, Ia.—Vincent Renney, of Omaha, was awarded the contract for installing 2 boilers in the Main st. pumping station for $7,000.

New York City.—The contract for constructing the first portion of the aqueduct work to bring water from the Catskill to this city was awarded to the Thos. McNally Co., of Pittsburg, for $4,126,000.

Cincinnati, O.—The Keeling & Ridge Co. was awarded the contract for constructing settling reservoirs for the new water works. Frank Burns secured the contract for laying 8,000 ft. of water mains in Observatory road for $5,440.

Albany, N. Y.—The Eddy Valve Co., of Waterford, N. Y. was awarded the contract for furnishing valves for preliminary filters for $13,600. The U. S. Cast Iron Pipe and Fdry. Co. was awarded the contract for furnishing c.i. water pipes and special castings for the preliminary filters for $6,946.

## BRIDGES.

Clinton, Ma.—A 500-ft. bridge across Kennebec river at Pishon's Ferry is contemplated.

Greensburg, Ind.—Bids are asked until May 6 for building a bridge. F. E. Ryan, co. audt.

Claremont, N. H.—Voted to erect a steel bridge at a cost of $37,000 across Connecticut river.

Racine, Wis.—Plans for the proposed new bridge at Lafayette ave. are being made. B. P. W.

West Chester, Pa.—The county commissioners have decided to erect 1 iron and 2 stone bridges.

Toledo, O.—Bids are asked until June 10 for building a steel concrete bridge at Cherry st. B. P. S.

Eugene, Ore.—A county bridge across McKenzie river at Hendricks Ferry is contemplated. Co. Comis.

Lock Haven, Pa.—A new bridge across the river between Jersey Shore and Antes Fort is contemplated.

Bryan, O.—Sealed bids are asked until May 14 for erecting several bridges. Jeremiah Clay, chm. co. com.

Tipton, Ind.—Bids are asked until May 6 for repairing and extending Louck's bridge. J. F. Barlow, co. audt.

Leavenworth, Kas.—Sealed bids are asked until May 6 for building a concrete culvert. J. W. Niehaus, co. clk.

Kokomo, Ind.—Bids are asked until May 8 for erecting 2 reinforced concrete bridges. Wm. L. Benson, co. audt.

Pensacola, Fla.—Bids are asked until June 4 for erecting a modern steel bridge across Little Bayou. Bd. Co. Comis.

Cleveland, O.—The question of issuing $700,000 bonds for rebuilding the Central viaduct will be voted on soon.

Leavenworth, Kas.—Bids are asked until May 6 for constructing a concrete culvert in Fairmount twp. Edward Jones, Co. engr.

Princeton, Ind.—Bids are asked until May 7 for moving and erecting a bridge across Richland Creek. Harry R. Embree, co. audt.

Janesville, Wis.—The city engineer has been directed to prepare plans for a new bridge across Spring Brook at Beloit ave.

Le Roy, N. Y.—Will vote May 7 on the issue of bonds for building a bridge over Oatka river, connecting Mill and Church sts.

Covington, Ind.—Bids are asked until May 7 for constructing 1 steel bridge and 2 concrete bridges. W. B. La Baw, co. surv., Veedersburg.

Washington, D. C.—Bids are asked until May 15 for furnishing the metal work of 2 60-ft. span steel highway bridges. U. S. Reclamation Service.

Elyria, O.—Bids are asked until May 6 for constructing 2 stone bridges across Black river at 4th and Broad sts. Jas. C. Smith, Prest. B. P. S.

Lorain, O.—Sealed bids are asked until May 13 for erecting and constructing the Aschenbach culvert in Amherst. Chas. Chandler, comis. clk.

Cleveland, O.—Sealed bids are asked until May 4 for constructing concrete abutments in Middleburgh and Brecksville twps. Julius C. Dorn, clk.

San Andreas, Cal—Bids are asked until May 7 for constructing a steel bridge with concrete piers across Mokelumne river, near Comanche. A. W. Poe, co. clk.

Fairmount, W. Va.—The county court will ask city council to contribute $4,000 towards the construction of a new bridge over the Monongahela river here.

Milwaukee, Wisc.—Sealed bids are asked until May 10 for constructing a bascule bridge across South Menomonee Canal at 6th st. Chas. J. Poetsch, chm. B. P. W.

Milwaukee, Wisc.—Bids are asked until May 4 for building a concrete stone arch viaduct (Melan System) over the Menomonee Valley at Grand ave. F. O. Phelps, co. clk.

Oneida, N. Y.—The property owners have submitted a petition to the board of public works asking for a cement bridge over Higginbotham Brook on Upper Broad st.

Buffalo, N. Y.—Bids are asked until May 2 for constructing a plate girder bridge on pile and masonry foundation across Stop No. 1 at River st. Chas. M. Morse, dept. engr.

St. Louis, Mo.—Bids are asked until May 21 for removing the present structure at 18th st. and erecting a new steel superstructure, with reinforced concrete and wood block flooring. Chas. H. Talbert, C. E., B. P. I.

Upper Sandusky, O.—Bids are asked until May 10 for constructing 1 steel bridge superstructure and repairing stone abutments of Keller bridge across Sandusky river in Antrim twp. and of Joe Best bridge in Mifflin twp.

Columbus, O.—Bids are asked until May 12 for the following: Engineer's estimate No. 722, roadways and approaches; No. 723, sub-structure, No. 724, superstructure, etc., and No. 725, roadway, sidewalk and concrete encasing on superstructure of Leonard Ave. viaduct in Marion twp.; No. 729, constructing new floor system on Dublin Ave. bridge over Olentangy River in City of Columbus; No. 739, constructing approaches, etc., to Chillicothe Pike bridge over Big Walnut Creek, Hamilton twp.; No. 740, raising and dressing roadway on approaches to Frank Road bridge over Scioto River, Marion and Franklin twps.; No. 741, con-

crete culvert and approaches on Jackson Pike at McDonald farm, Jackson twp. W. C. Cussino is co. audt.

## STREET LIGHTING.

Centralia, Mo.—Voted to install electric light plant.

Herrington, Kas.—Voted to issue bonds for an electric light plant.

Houghton, Mich.—The question of a municipal light plant will be considered.

De Ridder, La.—May vote on the question of constructing an electric light plant.

Holland, Mich.—The enlargement of the municipal electric light plant is contemplated.

Atlanta, Ga.—A special committee is investigating the question of establishing a municipal light plant.

Stanton, Neb.—Special.—Jesse Beard. cy. engr., says city voted, April 2, to buy an electric light plant.

Ashley, Mich.—Wm. Kennett & Sons are investigating the project of establishing an electric light plant.

Bessemer, Ala.—A 30 yr. franchise was granted April 16 to W. H. Harris, Jr., of Biloxi, Miss., for a gas plant.

Battleford, Sask.—Bids are asked until May 10 for installing an electric light plant. O. C. Lourie, sec'y-treas.

Galveston, Ind.—Plans for constructing an electric light and power plant are being considered by the town bd.

Crawfordsville, Ind.—The Duluth Syndicate will perfect plans to furnish gas to the city through the natural gas mains.

Pass Christian, Miss.—The question of establishing an electric light plant is under consideration. W. A. Terrell, mayor.

Greenfield, Ind.—The contract for new machinery for the electric light plant was awarded to Albert A. Ash, of Richmond, for $27,500.

Newark, N. J.—Plans for a municipal electric plant to be constructed at the City Hall have been completed. Michael J. McGowan, Jr., chm. lighting com.

Ballard, Wash.—A 3-year franchise has been granted Henry Drum for maintaining and operating a light and power plant in the manufacturing district.

Ft. Wood (New York P.O.), N. Y.—Bids are asked until June 1 for installing electric fixtures in certain buildings here. G. C. Burnell, constr. Q. M.

Ft. Wayne, Ind.—Bids will be received about June 12 for constructing a municipal electric light and power plant for lighting the streets and public buildings. Wm. J. Hosey, mayor.

Cold Spring Harbor, N. Y.—The contract for furnishing 41 street lights for 5 yrs. was awarded April 13 to the Huntington Light & Power Co., of Huntington, at $16.25 per yer, 20 c. p.

Danville, Ind.—A 25 yr. franchise was granted to Charles R. Lane of Ft. Wayne, April 22 to erect a gas plant for heating and illuminating purpose. The maximum rate for gas will be $1.35 a 1,000 cu. ft.

St. Louis, Mo.—Estimates have been prepared for installing a municipal lighting plant and with a view to adopting such a system when the city lighting contract with private corporations expires in September 1, 1910.

Los Angeles, Cal.—Sealed bids are asked until May 6 for furnishing and erecting boilers, engines, electric generators and motors for delivering current to the Los Angeles Acqueduct Cement Works. Horace B. Ferris, sec'y B. P. W.

New Castle, Ind.—Ambrose Petry, of Detroit, who recently purchased the holdings of the Newcastle Light, Heat & Power Co., has purchased a site and will erect a large power plant for generating electricity for commercial purposes.

Washington, D. C.—Bids are asked until May 3 for furnishing to the Forest Service 3,000 miles of No. 12 galvanized iron wire, 35,000 Standard Oak brackets, and 35,000 standard insulators to be delivered at Denver and Salt Lake City. James Wilson, sec'y Agriculture.

## GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Atlantic City, N. J.—The city crematory may be repaired. J. W. Hackney, cy. engr.

Ensley, Ala.—The contract for sprinkling the streets was awarded to J. C. Gordon.

Wheeling, W. Va.—The construction of a garbage crematory is contemplated. Chas. B. Cooke, cy. engr.

Jackson, Miss.—Sealed bids are asked until May 7 for $50,000 bonds for building a crematory. Ramsey Wharton, engr.

Oakland, Cal.—The mayor advised, in his annual message, the construction of a municipal garbage plant. C. W. Cross, cy. engr.

Salt Lake City, Utah.—Sealed bids are asked until 8 p. m., May 3, for constructing an extension to the garbage crematory. Louis C. Kelsey, cy. engr.

New York City.—Bids are asked until May 7 for constructing a reinforced concrete refuse destructor at West New Brighton, Boro of Richmond. Geo. Cromwell, prest. boro, Richmond.

## PARKS.

Sheffield, Mass.—A new public park may be established.

Bay City, Mich.—Voted to issue $200,000 for a public park.

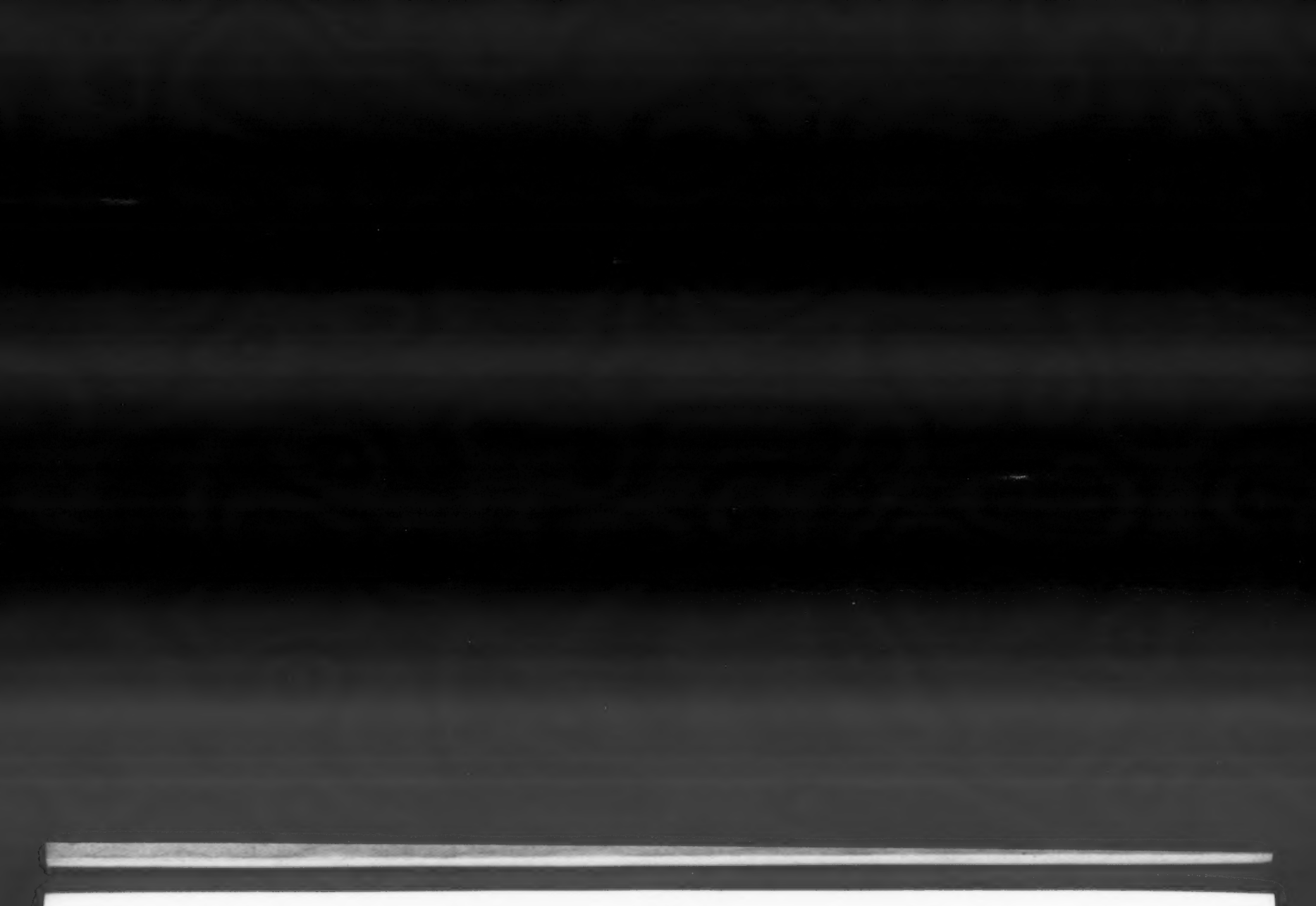
South Omaha, Neb.—City council voted to purchase site for 4 new parks.

Jersey City, N. J.—City council voted to issue $24,000 to purchase an addition to the city park.

Helena, Mont.—A tract of 29 acres has been donated to this city for public park by A. L. Smith.

Cincinnati, O.—Geo. Kessler, landscape Architect of Kansas City, Mo., has outlined a general system of parks and parkways for this city.

## FIRE APPARATUS.

Donnybrook, N. D.—Council is considering the question of fire protection.

Jackson, Miss.—Bids are asked until May 7 for bonds for purchasing a new steamer for the fire department. Ramsey Wharton, mayor.